The CONSERVATION ESSAYS

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The CONSERVATION ESSAYS

A text book on the general subject of conservation for school and other educational uses.

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By F. W. LUENING

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CHAPTER 1

A. Introduction

B. Conservation—A foreword for teachers

(1) America's Early Forests

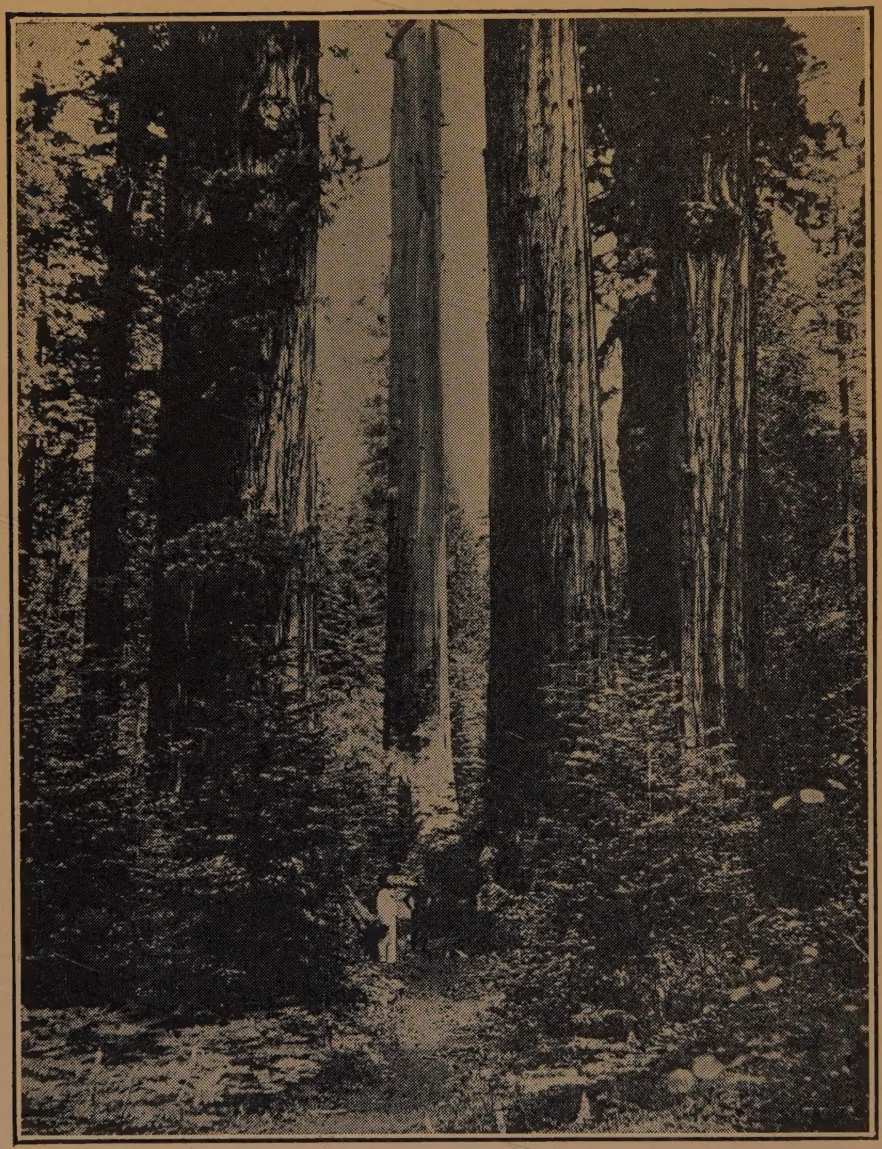


Photo by E. G. Plummer; courtesy U. S. Forest Service.

The "Big trees" of the Pacific slope with a "Mother of the Forests" in the background. It was such forests as these that early Americans found in the west. But similarly rich, luxurient and interesting forests were on the Atlantic coast from Maine to Florida, in the Great Lakes regions, and generally encircling the country, leaving the great plains in the center. Other woodlands, though containing smaller trees, were no less boundless, no less rich in timber and wild life, no less competent to yield timber, meat, nuts, berries, furs, skins, and many other things including pure water.

INTRODUCTORY

"Conservation," until recently, was intangible; the word had a hazy meaning. However, in recent years it has come to express: "The wise use and proper perpetuation of natural resources"—especially forests, animals, birds, fishes and waters.

In these recent years, too, demand for a course of study in conservation has developed. In many states, inclusion of the subject in the school curriculum has been urged. Some educators have groped about, trying to inaugurate such a course. They have been handicapped by lack of precedent and program.

Just what, of conservation, should be taught? What text books or other published material should be used? What course of study should be followed?

Hoping to aid, this author considered a series of text books. He discovered that educators had no clear idea of what they wanted. He prepared preliminary manuscript for analysis by one of the largest eastern text book publishers. It was held by them for more than a year while their staff probed educational and market demands. Nothing conclusive was discovered.

The manuscript, in various forms, then was reviewed by able school authorities who commented, offered constructive criticisms, suggested changes, but failed clearly to disclose what prospective students, the schools, the reading public or they, themselves, wanted or should have.

The author, therefore, determined to proceed without precedent or further pedagogical guidance. Instead of text books he decided to prepare a series of essays for general reading. He proposed to make them simple enough for school use, even in the middle grades; comprehensive enough, if possible, to give the advanced and the lay reader a fairly complete conception of "conservation" as the subject now is popularly understood.

He felt that a series of essays that would establish some point as a beginning, and chart some logical channel for this subject, might be helpful. The series might serve as a basis for lecture, reading or study courses in the schools; it might be an aid to boy scouts who, in their preparations for merit badges obvi-

ously are without adequate reading material; and it might help to inform, or unify the ideas of those many groups everywhere in the country—Walton chapters, women's clubs, sportsmen's organizations, and a host of others—now interested in the subject.

The approach, in these essays, is from the standpoint of the practical outdoorsman and makes no attempt to follow any pedagogical formula. The material has been carefully gathered or is the result of personal observation in the forests of Canada and the United States, of close association with the out-of-doors, of much contact with conservation authorities, and of many hours spent in the habitats of animals and birds. It attempts to picture these forests, animals and birds as they were, as they are today, as they might be if wisely used, perpetuated or restored—and what the processes of conservation are.

It seeks to set down, in logical and orderly fashion, this subject of conservation so the student or general reader may, after having read the last of the seven essays, have a conception of "what it's all about."

Each of the seven essays is complete, in that it has a logical beginning and ending and may be read alone. But, of course, the essays are related and are intended to carry the student on, step by step, through the subject. For purposes of study, all seven essays should be used, one following the other in proper order.

CONSERVATION

"Conservation" is an increasingly important matter everywhere in the United States.

The word "conservation," loosely construed, means the protection and wise use of natural resources.

Natural resources, of course, are any natural creation used by men. Thus water is the first and most important natural resource. The minerals—gold, silver, iron, coal—are others. The oil under the earth, forests, waters, animals and birds, all are natural resources.

These and many others may be grouped in two classes. The first are those resources over which man has little control. He uses but cannot restore or reproduce them. Thus man may use coal but he cannot reproduce or recreate coal. He uses iron, silver and oil, but cannot reproduce or recreate them.

On the other hand, men may use trees, destroying them wholly; yet men also can grow trees—reproduce, or recreate them—by planting seeds, roots, or bits of living tree tissue.

For the purposes of these essays—and for that matter, in the ordinary sense of the word as used everywhere in the United States—it is this second, or reproductive group of natural resources that is meant when we write of "conservation."

Men simply mine coal and after they have exhausted a vein that is the end of it. Nothing they can do will replace the coal. But men may harvest a forest and, if they will carefully "conserve," or use the methods of conservation, the forest can be restored. So "conservation" has popularly come to mean the protection and wise use of those resources that can be perpetuated or replaced.

Not only forests, but the animals and birds fall naturally into this group. Water also falls into it—not logically, because men can reproduce it, for of course they cannot; but because they can perpetuate it, in that they can assure its continued presence in the lakes, streams and pools.

So, popularly, everywhere in the United States, "conservation" has come to mean the protection, perpetuation and wise use of forests, animals, birds, flowers, rivers, lakes and marshes. In these booklets the word "conservation" is so treated. As used here "conservation" means the protection and wise use of the "restorable" or protectable resources.

Forests are, perhaps, the first natural resource that Americans should learn about—not only because they are restorable but because they are the basis of most other conservation. Without forests there would be few wild animals or birds, probably not much water. Strip the world bare of forests and the ages would witness a slow drying up of the whole earth's surface. Therefore a study of forest conservation seems a logical beginning.

It seems important that, in introducing this subject to students, teachers make them understand that it may provide a fascinating, even a romantic study. When the student begins the study of forest conservation, for instance, he is entering the hunting grounds of the Indian. It was in the forests that the red man raised his tepee, stalked his game, fought his battles. And later, when the subject of brooks and streams, rivers and lakes, is reached, it may well be remembered that it was over these water courses that the first American white men paddled their canoes, and on their shores that they found the moose or caribou, the elk or deer, that were their prey and sustenance.

Certainly it is in the forests that wilderness creatures live their tragedies and comedies today, from the Rocky

mountain grizzly bear to the timid wood mouse of the thickets. It is in the hemlocks that the great horned owl lurks, and under the spreading boughs of the spruce tree that the snow shoe rabbit plays in winter. It is in ferny glens or reedy hollows that the porcupine likes best to roam and in tangled thickets that the brown bear gathers fruit.

So a student's thoughts may well roam in the forests as he studies conservation. His imagination may be encouraged in this respect, though it should be guided away from over-romanticizing the chase and the kill. For, while hunting and fishing are incidents of conservation, these "sports" are a mere by-product of conserved forests and waters. And, while hunting and fishing need not be deplored, nevertheless conservation—the protection and perpetuation of trees and their related resources—has a higher and nobler aim than merely providing hunting and fishing. Teachers may fairly suggest this.

However, conservation should be sanely approached in the schools just as it should be sanely practiced in the forests. For neither is conservation an impractical and idealistic effort to protect and perpetuate something for no good purpose. It would be useless to protect and preserve trees merely so they might reach a great age, totter like an old man, fall at last in a windstorm and molder on the forest floor. That would be taking useful resources out of use. Real conservation never tries to do that. It protects and grows trees so there will be trees to use. It preserves woodlands and forests so there will be shade and shelter over the soil and its waters. It protects and preserves wilderness creatures so there may be such creatures to study, to enjoy, to make use of; and if, under wise protection, a species of wilderness creature becomes numerous enough to provide good hunting, then hunting may be an incident of conservation.

Certainly many men consider the conservation of deer, moose, elk or rabbits, to have but one purpose: To provide a supply of those creatures so they may legitimately be killed in the name of sport.

In any event conservation should be made an interesting study, backed by a little of the historical romance that has ever been a part of America's forests and wilderness life; backed also by sound, practical suggestions, making plain that natural resources should be perpetuated largely so they may be used by men.

In that use, of course, the matter of beauty should have its fair place. For, after all, even "practical" men admit the practical value of beauty. They spend large sums to beautify their home surroundings, planting shrubs and trees, growing flowers, even attracting birds. So it is as justifiable to preserve forests to beautify a state or a nation as it is to perpetuate them because they will produce timber. Both are practical purposes. And, while conservation as taught in the schools, should not lean toward the "maudlin sentimentality," of which conservationists sometimes are accused, neither should the sentimental or ideal side be ignored. After all, neither the American people or any other people can afford to approach their various problems solely from the so called "practical" viewpoint; and any nation, especially in teaching its children, must recognize the worth of ideals. In this matter of conservation, the beauty of the forests and waters, of bird songs, of furtive, wilderness creatures lurking in the brush, and the quiet solitude of forest aisles with their peace and comforting influences, have a place.

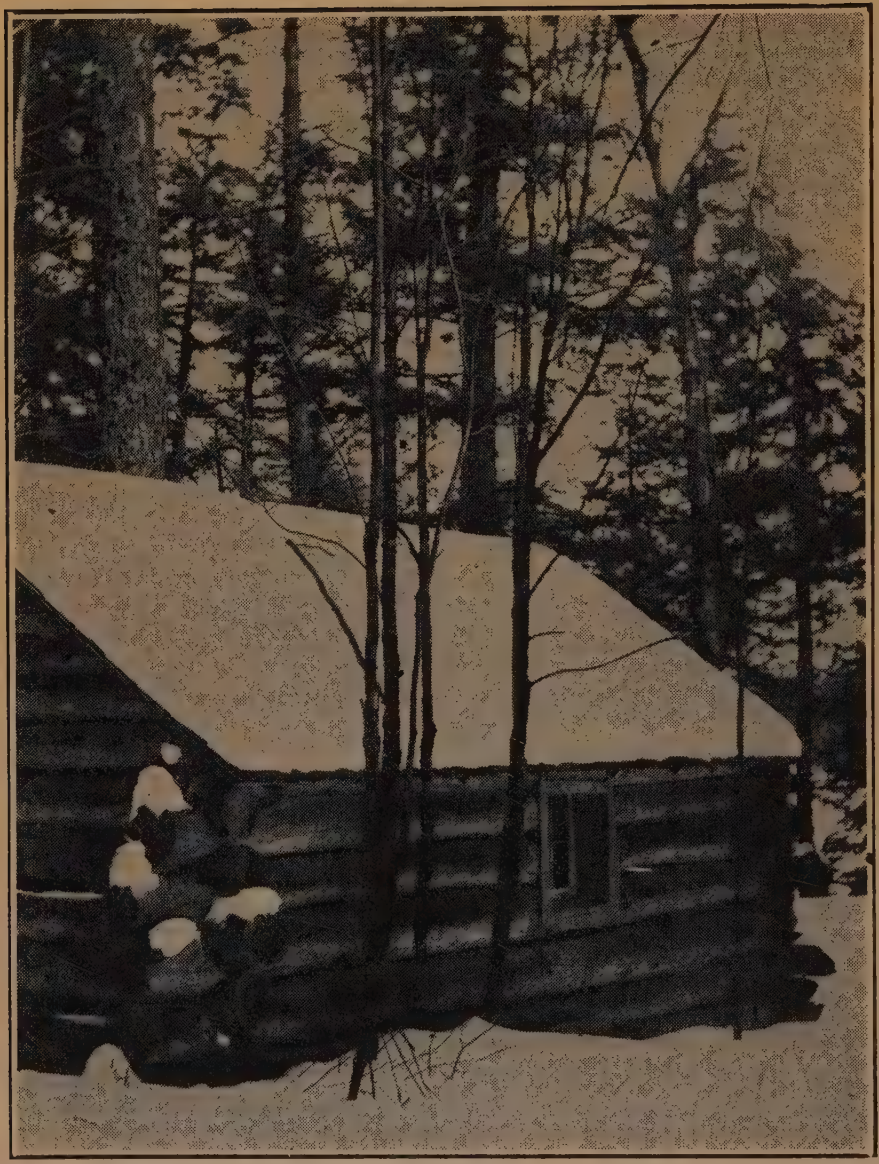
It is suggested, therefore, that teachers remember the practical purposes of conservation, yet do not forget the ideal side; that they make both phases plain, overstressing neither; and that they endeavor to give to the subject a bit of the historically romantic background that is its logical part.

THE EARLIEST FORESTS

The Spanish explorer, Panfilo De Navaez sailed to America in 1527, when the first white men were following Columbus to the new world. He and his party skirted the Florida coast in quaint old boats, looking for gold. He found forests instead—palm trees on the beaches, cypress and mangrove trees in the marshes, southern pines on the highlands. He was scornful of these because he wanted "treasure." That these forests were America's real "treasure," never occurred to him.

So he and his men floundered about under the trees until they became lost. Little is known about what then happened except that at last only Captain Cabeza De Vaca and three men were left.

The captain and his three comrades wandered on, always through great forests, constantly living under trees until, after nearly ten years, they came to an open, desert-like country and later found a little Spanish settlement on the coast of Mexico. There they told about their life and wanderings along the southern edge of what is now the United States and how, from the Florida coast to a point midway in Texas, they found one great, hampering, annoying forest.



Almost the first act of the first colonists was to go to the forests for logs, so they might build defenses against the Indians and shelter against the weather. Out of those forests they got the materials for crude cabins like this one, rough in appearance but sturdy against the winds, snows and cold. Rude dwellings like this one sprang up, first on the Atlantic coast, later pushing westward, until they dotted the new land. It was in such shelters as these that American home life began, that America's first children were born, that their characters were shaped and that the destiny of America was written.

Thus Captain De Vaca first disclosed that the forests of the southeastern states were so big that men could wander around in them for ten years and never get away from the trees. Of the riches that later would be yielded by these forests these Spanish treasure hunters never dreamed.

De Soto Finds Forests

A few years later, in 1539, another Spanish explorer came—Hernando De Soto. He, also, landed on the coast of Florida, but went inland and northward. He, also, was looking for treasure and for three years he and his men wandered up the eastern slopes of the Allegheny mountains to the Savannah river in Georgia, nearly to Mobile bay in Alabama, then reached the Mississippi river near where the city of Memphis, Tenn. now is.

All over this area De Soto found more unbroken forests but no "treasure." His trip, too, disclosed that all of the southeastern states, from the Mississippi river to the Atlantic ocean at Florida, and at least as far north as the Savannah river in Georgia, were covered by forests when white men first came to America.

Going again into history: In 1607 Captain John Smith and his followers came to build Jamestown in Virginia, a little farther north than De Soto had traveled. They went to work

with saws and axes because they, too, found forests. They needed protection against the Indians, so they cut trees, dragged them to the banks of the James river, and set them up, side by side, until they had a stockade. No Indian arrow could penetrate it so, almost from the first, the forests befriended Captain Smith and his people.

When the stockade was finished, the men built a block house, mounted their guns on it and left loopholes for their rifles. They then built cabins of logs and later crude furniture of saplings or branches or boughs. The very cradles, for the first children born in that wilderness settlement, came from the forests. Yet the settlers did not realize, even then, that the forests were America's real "treasure." Though history tells us of other "riches" in the new land it does not mention the great, quiet forests that gave, year after year, of their protection, shelter and substance.

In fact, the early forests were looked upon as a nuisance. They were in the way. Men needed room for fields and plantations. So the settlers at Jamestown went patiently to work cutting down, slashing, burning the forests, so they could plant tobacco and other crops.

Thus, as the Spanish explorers found forests in the southeastern corner of the country, the people of Jamestown found them again,

farther north in Virginia. From Virginia, then, southward to the tip of Florida, and around the coast midway through Texas, there were forests.

Trees Serve Pilgrims

In 1620 the Mayflower approached America. For more than two months the Pilgrims had been watching the sea, spreading away in every direction. Then, one day, the lookout shouted: "Land, ahoy!" and, probably, all on board rushed to the rail and looked hard over the vessel's prow toward the distant horizon. Ultimately they saw the surf breaking against the beach, the rocks jutting out, and the forests—spreading back as far as the eye could see, clothing the hills in green, their friendly branches waving a welcome to this strange, new land.

So the Mayflower sailed into Plymouth harbor in Massachusetts. There were forests on that shore, but there also was a clearing. History tells us that the clearing helped decide the men on the Mayflower to land where they did. They saw this opening in the greenery and knew there would be room for homes and fields. Yet the first thought after landing must have been of the forests. For, of course, the Pilgrims needed shelter and believed they might need protection against the Indians, just as Captain John Smith and the people of Jamestown needed them.

In the hard year that followed, those forests did much to help the Pilgrims live—yet the Pil-

grims probably did not think about that. In any event, as the Spaniards found forests at the southern end of the country and the people of Jamestown found them in Virginia, so the Pilgrims found them on the New England coast. It is clear then that great forests grew all along the Atlantic ocean, from the northern to the southern boundary of what now is the United States. And they extended at least to the Mississippi river in the south because De Soto found them there.

The Spreading Mississippi—Its banks and islands, now carrying only remnants of the old forests, were closely overgrown by great trees when Pere Marquette discovered them in 1669.

Pere Marquette's Trip

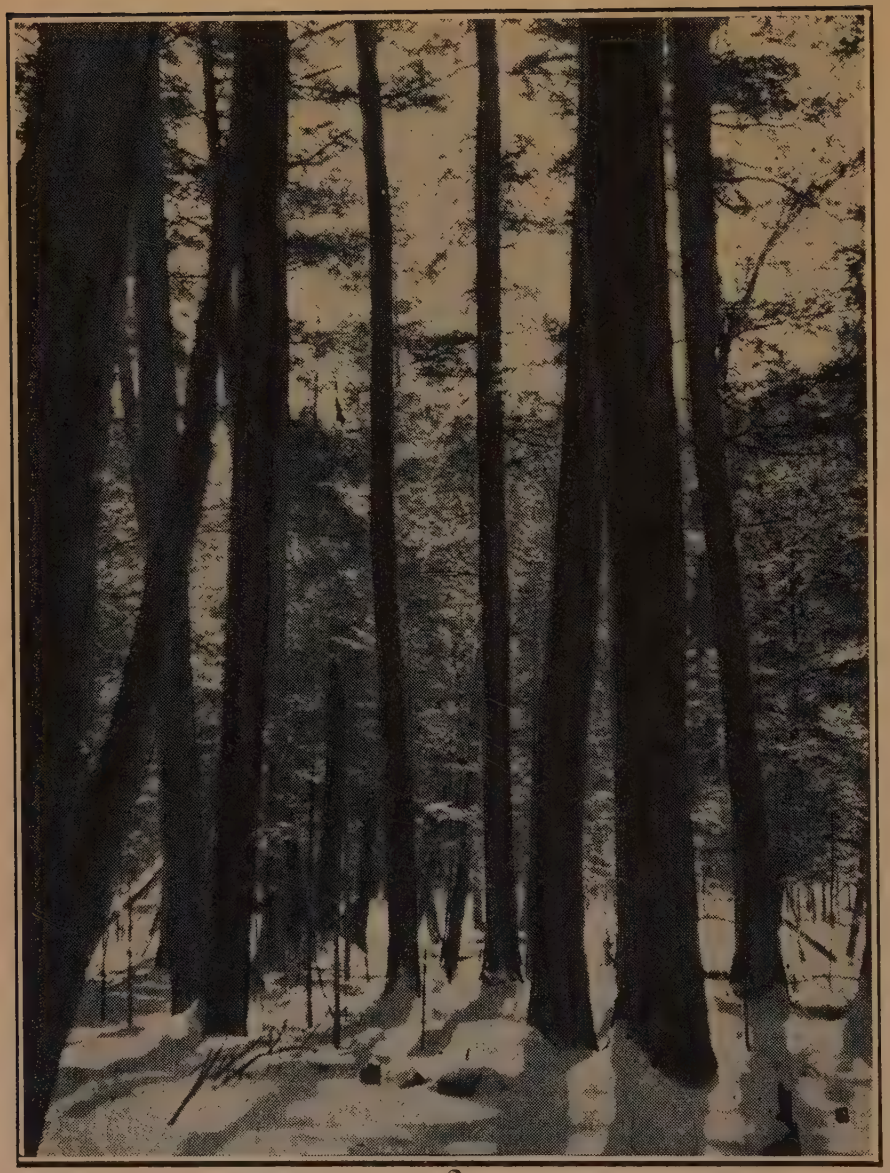
In 1668 a French Jesuit missionary came to St. Mary's river which flows between Lakes Superior and Huron. He found fine forests there and in them built a mission for the Huron Indians. But soon the Sioux made war on the

Hurons; so this Jesuit, who, of course, was "Pere" or Father Jacques Marquette, moved them over to Mackinac island, in Lake Michigan. Again, on the island, he found forests.

Then the French king asked him to explore the Mississippi river. He started with seven men in two canoes. They paddled across the waters of Lake Michigan to St. Ignace, in the state of Michigan. Then on, along the Upper Michigan coast, down into Green Bay, along the Wisconsin coast, to the mouth of the Fox river, and up that river into Lake Winnebago in Wisconsin.

On all that long route they found practically unbroken forests. On the bluffs were towering pines. In the low-lands, by the shores, great cedars grew. Back in the marshes were tamaracks. Often where the hills rolled to the westward the lace-like branches of the hemlocks hung against the skies. Then spruces stood, like spires, on the slopes. And higher up, on the ridges, were hardwoods, maples, elms and hickories. Every now and again friendly birches gleamed white on the hills, and there were poplars and beeches and ashes everywhere they went. Above all else towered the great white pines.

Father Marquette was passing through the greatest white pine forests that the world had ever known.



And in the Lake States—Minnesota, Wisconsin and Michigan—stood pines as mighty as any in the new land, and hemlocks of which a few, like these, yet remain. These forests later gave the Lake states a tremendous harvest of excellent timber but early in American history they gave what other forests everywhere were giving to Americans—logs for homes, stockades and forts, thus providing protection against Indians and shelter against the weather. They gave, too, a rich harvest of furs, since the Great Lakes forests abounded in game.

From Lake Winnebago—that big, shallow, inland lake in Wisconsin—he paddled on up to the headwaters of the Fox river, then portaged his canoes and supplies over to the Wisconsin river, then drifted down the whole length of the stream. It crosses much of Wisconsin, and Marquette found that it flowed under trees, towering high on the banks, coming to the water's edge, crowding every bend in the great river.

At last he came to the Mississippi—the Father of Waters. He saw, as the Wisconsin widened out and emptied into the Mississippi, more forests, with cottonwood trees mingled with the tamaracks and cedars, with willows draped over the water's edge, with every one of the little islands that form the bottom-lands green with a forest cover.

Then Marquette and his men went on, for 300 miles, down that greatest of our streams. They turned back below the mouth of the Arkansas, in the state of Arkansas, and probably not far from the place where De Soto had been a hundred years before. Along the river were more trees, although Marquette also found some prairies. For a time he was out of the forest land. But on the way back, up the Illinois river, up the shores of Lake Michigan to Sturgeon Bay, the forests grew again.

Marquette, in these travels, passed through the forests of the Lake States—Michigan, Min-

nesota, and Wisconsin. If he could have traveled over every mile of those states instead of just along the rivers, he would have found forests almost everywhere he went.

So, as the forests grew on the Atlantic coast where the Spaniards, Captain John Smith and the Pilgrims were, they also grew along the northern border, at the St. Mary's river, around the Great Lakes, and far down the Mississippi river.

In fact, these historical wanderings disclose that nearly all of the eastern half of the country was covered with dense forests. Of course, there were lakes and swamps and some bare mountain peaks and hillsides, and even some coastal and other plains scattered here and there; but for the most the eastern United States was forest covered.

With Lewis and Clark

Next came other explorers who went westward to the Pacific coast. It was in 1803 that President Thomas Jefferson wanted to know more about "the great northwest." He asked Captain Meriwether Lewis to go. Captain Lewis chose his friend, Captain William Clark, to go with him, and the two selected a party of 29 soldiers, some French and half-breed guides, an Indian woman and a few others—45 people in all.

They gathered at River Dubois, in Illinois, in May, 1804, crossed the Mississippi, then went up the Missouri river, which flows through Missouri, Kansas, Nebraska, South Dakota, North Dakota and Montana. Then, leaving the river, they crossed the Rocky mountains and went to the Pacific coast.

From Lewis and Clark came reports about a part of the country that had no trees. From a point somewhere near the Wabash river in Illinois, through parts of Missouri, Kansas, Nebraska, and the Dakotas, there were immense plains instead of forests. Tall grasses grew, buffalo herds grazed, but the only woodlands were in the river bottoms. These sections later were called "The Great Plains." Foresters think that trees once grew upon them, just as they grew on the Atlantic coast and around the Great Lakes; fires or other causes may have destroyed them. In any event, a wide band of country was just an open plain. Beyond this band, Lewis and Clark found a territory too dry for tree growth. There so little rain fell that the country was almost desert-like in places. On the slopes of the Rocky mountains they found trees growing again and, by and by, more fine forests. These grew up to "timber line;" that is, up to altitudes beyond which trees do not thrive.

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Then, across the mountains on the Pacific slope, the trees began again and there were for-

ests more wondrous even than those of the Great Lakes or the Atlantic coast. The enormous Douglas firs grew to towering heights; the spruces were the biggest in the country and, had Lewis and Clark gone south, into California, they would have found the giant redwoods, the largest of all trees and the oldest living things in the world.

Again the forests helped men, for Lewis and Clark report that, at Mandan, in North

On the slopes of the Rockies, Lewis and Clark found trees growing again; and, on the Pacific coast, forests more wondrous even than those of the Great Lakes or the Atlantic coast.

Dakota, "log houses were built and surrounded with palisades;" and on the Columbia river in Oregon and Washington, where the great western forests stood, the soldiers "built a rude stockade some fifty feet square, which they named

Fort Clatsop;" and "built log houses inside this stockade and here the party spent the winter."

On Pacific Slopes

Continuing through history, other explorers and adventurers, like the "Forty-niners" who went to California, and the great caravans crossing the country into Oregon in covered wagons, found forests near the Pacific, on the slopes of the Rockies, and quite generally in the western one-third of the country.

So, in a general way, the early forests were on both coasts, came well into the interior, and then yielded to plains and deserts.

These early American forests were not one, solid, unbroken lot of trees. In the Lake States they were almost solidly grown; for many miles in the Alleghenys there was no break in them; over hundreds of thousands of acres on the Pacific slope they never opened; but, of course, the forests as a whole had open places and small plains here and there, and their boundaries were irregular.

Just so the plains and deserts were not "solid" either. Along the river bottoms and in some scattered spots there were tree-clusters, small woodlands, even little forests. Then in some of the southern states there were deserts; in the Dakotas were the "Bad Lands," and in

Montana, bare mountain ranges. But there also were scattered forests, some of them large, in some of these states.

So it is not easy to exactly bound the forests, plains and deserts. It is generally right to say that the forests grew nearly around the outer edges of the country and came well into the middle, while the plains lay between. A more accurate measure is a division of the forests into five great parts.

Five Great Forests

The first was *the northern pine forest,* extending from western Minnesota, east to the Atlantic ocean, and from Canada, south to northern Illinois, Indiana, Ohio and New Jersey; then, narrowing down on the Appalachian mountains, taking in nearly all of Pennsylvania, West Virginia, western Maryland and western Virginia, and reaching as far south as northern Georgia.

Next came *the southern pine forest.* It began in southern New Jersey and then widened out to the south and west until it reached the Gulf of Mexico, bounded by the open country of Texas, Oklahoma and Missouri.

Next came *the central hardwood forest.* It was between the northern and southern pine forests, beginning at the Atlantic ocean and stretching nearly to the Mississippi river.

Then came *the Rocky mountain forest.* It grew along the mountains from Idaho and Montana, through Wyoming, Utah and Colorado, to Arizona and Mexico. This was a less "solid" forest than the others, often broken by desert places. Really it was made up of scattered, small forests, or woodlands, with grazing land or treeless plains and valleys in between.

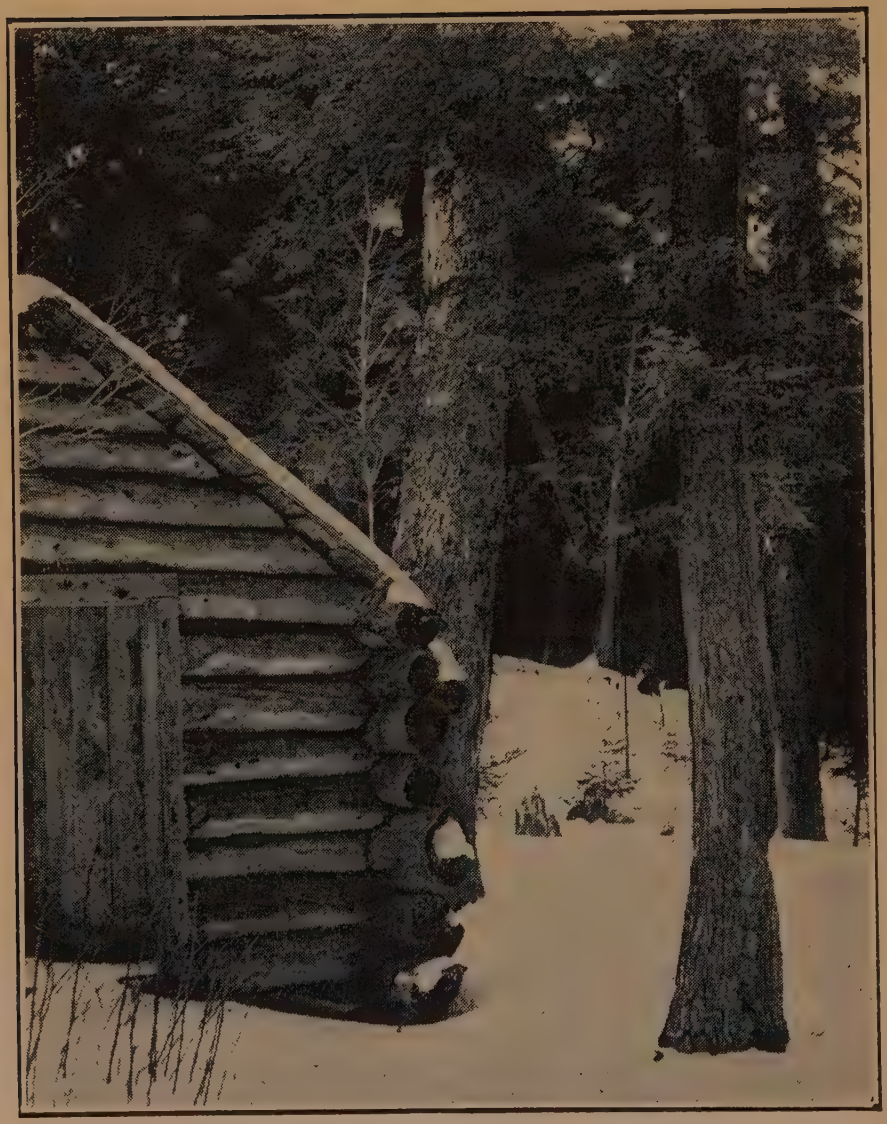
Finally came *the Pacific coast forest,* which grew in Washington, western Oregon and northern California.

Encircle the Country

So, in a general way, the forests covered much of the eastern United States, all of the Lake states, the northern and western sides of the country and went down the Pacific slope midway into California; or, generally, around the edges of the country, leaving deserts and plains in the middle.

This historical trip suggests how tremendous the virgin forests were. They covered about 850,000,000 acres of the country. There are 1,937,144,960 acres in the whole country, not including Alaska and other possessions, so nearly 45 per cent of the land once was forest covered.

Since about 34,000,000 acres are covered by lakes and rivers, nearly half of the real land was covered by forests when white men first came to



The Maine Woods—Where pines and hemlocks, spruces and balsams grew, as they grew all across the northern boundary of the country and all around the Great Lakes. Here, despite deep snows, frost that cracked the trees, blizzards that raged through endless branches, men found they could live. As elsewhere in the new land, the forests provided them with logs, and cabins were built to shelter them against the weather. And, as the Pilgrims, the Virginia colonists, the later pioneers in the middle west, and the adventurers on the Pacific coast lived by the bounty of the woodlands, so the pioneers lived in Maine. First of all Maine went to the forests; later Maine also went much to the sea, but it was the forest that provided her earliest needs as the forest provided for other early Americans.

America. That means in 1492 when Columbus came, or in 1527, when de Navaez sailed up the Florida coast.

Today, somewhat more than 400 years later, only about 120,000,000 acres of the *original* timber remains standing. That is less than one-seventh of the acreage found by the first white men. It means that in 400 years there have been cut down or destroyed, 730,000,000 acres of trees. That is more than 180,000,000 acres every 100 years. At the same rate the rest of the *virgin* forests will disappear in less than 75 years. However, cutting and destruction now are proceeding more rapidly; so foresters say that all *virgin* forests will be gone in about 40 years if the present rate of destruction continues. Of course, some new trees are growing and have, in part, replaced the old, virgin forests.

These and other forest figures are only approximately correct because trees are cut every year and forest statistics constantly are changing. However, about six-sevenths of the original forests are gone and the rest are falling fast. Conservationists say this destruction must be checked, or compensated for, or the country will suffer a timber famine or other troubles—for, of course, forests provide more than timber. They absorb water, hold the soil in place, affect climate and even rainfall. So conservationists urge protection. That, however, does not mean

that no more trees should be cut; that lumbering should cease; that America should stop using wood. It only means that tree harvesting should be done with care; good, mature or "ripe" trees should be taken, but young trees left; fires should be kept out of the forests; opportunity should be given it to reproduce itself.

Nor do conservationists say: "You must plant a new tree for every old tree you cut down"—least of all, a new tree in the same place from which an old one was taken. There are places that ought to be cleared of trees; places where fields and meadows would be more useful to men; places where cities, villages or industries must be located.

But there are other places where trees ought to be grown; places where the soil is better adapted to forests than to agriculture. There are hillsides, rough valleys or areas of poor fertility where trees will produce a better "crop" than anything else. Such places should be forested. There trees should be planted, or replanted, if old trees are cut down.

In fact, the whole idea of wise conservationists is to treat America's forest as other crops are treated—harvest the crop, to be sure, when it is ripe for the harvest, but also replant or regrow the crop. Keep forests thriving, by allowing young trees to sprout and flourish, by being careful not to damage them during lumbering

operations, and by growing millions of new trees in "nurseries," then transplanting them to such places as will best grow trees.

John Muir's Picture

John Muir was a naturalist, traveler and writer. He was born of Scotch parents, near the Fox river in Wisconsin, and became interested in trees when but a boy. He attended the University of Wisconsin from 1861 to 1864, then tramped to Panama where he stayed awhile; then went to California, then to Alaska, and then to Switzerland. Later he spent 10 years in the Yosemite valley and then was married and settled in the California hills. He loved the forests and wrote many fine things about them, among them this description of these earliest American forests referred to in this essay:

"Wide branching oak and elm in endless variety, walnut and maple, chestnut and beech, ilex and locust, touching limb to limb, spread a leafy canopy along the coast of the Atlantic over the wrinkled folds and ridges of the Alleghenies —a green, billowy sea in summer, golden and purple in autumn, pearly gray like a steadfast, frozen mist of interlacing branches and sprays in leafless, restful winter.

"To the southward stretched dark, level-topped cypresses in knobby tangled swamps. To the northward over Maine rose hosts of spiry,

The redwoods or sequoias in the John Muir woods in California. These were the most magnificent of all the trees found in America as the pioneers moved westward, across the plains and to the Pacific coast. They once stood massed in great forests but thousands of them were cut for timber. Today comparatively few remain and these are mostly in reservations or forest preserves. John Muir woods is such a reservation. The redwoods or sequoias are the oldest living things in America and were old before the first explorers came to the Atlantic coast.

rosiny evergreens—white pine and spruce, hemlock and cedar, shoulder to shoulder, laden with purple cones, their myriad needles sparkling and shimmering, covering hills and swamps, rocky headlands and domes, ever bravely aspiring and seeking the sky; the ground in their shade now snow-clad and frozen, now mossy and flowery; beaver meadows here and there, full of lilies and grass; lakes gleaming like eyes, and a silvery embroidery of rivers and creeks watering and brightening all the vast, glad wilderness.

"Thence westward were oak and elm, hickory and tupelo, gum and liriodendron, sassafras and ash, linden and laurel, spreading on, ever wider, in glorious exuberance, over the great fertile basin of the Mississippi, over damp, level bottoms, low, dimpling hollows, and round dotting hills; embosoming sunny prairies and cheery park openings, half sunshine, half shade; while a dark wilderness of pines covered the region around the Great Lakes. Thence, still westward, swept the forests to right and left, around grassy plains and deserts a thousand miles wide; irrespressible hosts of spruce and pine, aspen and willow, nut-pine and juniper, cactus and yucca, caring nothing for drought, extending undaunted from mountain to mountain, over mesa and desert, to join the darkening multitudes of pines that covered the high, rocky ranges and the glorious forests along the coast of the moist and balmy Pacific, where new spe-

cies of pine, giant cedars, and spruces, silver firs and sequoias, kings of their race, growing close together like grass in a meadow, poised their brave domes and spires in the sky, three hundred feet above the ferns and the lilies that enameled the ground; towering serene through the long centuries, preaching God's forestry fresh from heaven."

QUESTIONS

1. What did the earliest Spanish explorers find growing on America's coasts?
2. Of what material did Captain John Smith and his followers build their cabins at Jamestown?
3. Where did they get this material?
4. What was the nature of the country settled by the Pilgrims—was it bare, grass-covered, or tree-covered?
5. What was the nature of the country through which Pere Marquette passed — was it desert-like, of grassy plains, or wooded?
6. What type of forest did Pere Marquette especially find in the Lake States?
7. What was the general nature of the eastern half of America in the early days of the white man—was it generally bare, grass-covered, or forested?
8. What was the general nature of the country from a point somewhere near the Wabash river in Illinois, through parts of Missouri, Kansas, Nebraska, and the Dakotas? What was this area later called?
9. What was the nature of the country on the Pacific slope?
10. Name the FIVE GREAT FORESTS and roughly describe their boundaries.

Themes for Compositions or Recitations

Write a composition (or recite) on one of the following topics.

TOPIC No. 1

Carefully re-read page 11 and the first paragraph on page 13, of chapter 1.

1. Now consider that Captain De Vaca and his companions were lost in the southern American forests without modern weapons and practically without food supplies, yet wandered about for 10 years before reaching an outpost of civilization.

2. Draw on your imagination: — How was it possible for them to do this? What must they have found, abundantly, in the forests to shelter them against storms, to feed them, to clothe their bodies?

3. Describe the forest resources and how De Vaca and his men probably used them. What conclusion must be drawn—were America's early forests rich or poor in useful trees, moss, bark, fire-wood, fur-bearing animals, birds, wild fruits, nuts, and fresh water in streams and pools?

4. If the forests yielded generously for De Vaca and his men, what did they do for other ex-

plorers and early settlers in America? Were they valuable and worth preserving? If so, explain why.

TOPIC No. 2

Carefully re-read the last paragraph on page 27 and all of page 28 of chapter 1.

1. These paragraphs briefly describe "forest conservation" and what it is. Now write from 500 to 750 words on this subject.

2. Remembering that forest conservation does not mean "stop using wood," explain how trees may be cut for lumber, yet forests need not be destroyed.

3. Remembering that forest conservation does not demand "a new tree for every old tree that is cut," explain where planting should be done or how, without artificial planting, forests will restore themselves.

4. Think about this: NATURAL forests do not disappear, though trees constantly are dying, are blown down in storms, or are shattered by lightning. Yet no man plants new trees in a natural, wilderness forest. How, then, are new trees supplied? Having explained that, explain how men can, while lumbering, destroy trees as does the wind or the lightning, yet can have new trees without artificial planting.

A birch forest in the Lake states, converted into a delicate, crystal creation by the frost.

Men cannot be much in the forests, contemplating such beauty as this, and remain unimpressed. The Pilgrims, toiling among the trees as they garnered their harvests of logs; other early Americans, going to the maple groves for syrup, or to the woodlands for furs; pioneers, living under trees and gaining their sustenance from them, certainly were largely influenced. In time forest utility and beauty impressed themselves upon American character. Subtly they inspired men—first to a wide use of forest products; later in less material ways.

It is possible that the towering pines and spruces, or the great sequoias of California, may have been the inspiration even for America's present and highly original type of architecture—towering buildings for which no precedent came from Europe and for which no example was offered by any other country in the world. Obviously, American ingenuity, resourcefulness and initiative largely were forest-born.

CHAPTER 2

A. Forest Conservation

(2) Forest Influences

FOREST CONSERVATION

In this second essay on conservation, the influence of forests upon American colonists and pioneers is discussed—with a view, of course, to showing how vital these resources were, and still are, to American national life.

However, the student should realize that forests by no means are all of the so-called "natural resources." Water is perhaps the first and most vital of these; the soil is of second importance; the geological formations—granites, limestones, clays, etc.—are natural resources; so are the gases and oily deposits under the earth. The ores of which men make metals are natural resources, as are the animals, birds, reptiles, fishes and other creatures of the waters, fields and woodlands.

Nor did pioneer Americans fail to use numbers of these creations and gain much of their security and ultimate prosperity by them. "Conservation" in the broader sense must deal with all of them; but in the more restricted and practical sense it deals most specifically with forests as a basis, then with waters, creatures of the woods and fields, marshes, swamps and scenery.

Soil conservation belongs more properly to the science of agriculture than to this newer science of "conservation." Wise use and restoration of fertility has become an accepted part of modern farming. While nothing could be more important than properly to conserve the soil's fertility, the matter is largely in the hands of agriculturists and need not concern the conservationists.

Also, American pioneers did not trouble themselves about preserving soils. The country was so large and land so plentiful that the easiest way to escape an impoverished

farm was to find a new one, on virgin and fruitful land. Early Americans did exactly that.

Nor were the other resources immediately vital to the colonists. They did not drill for oil, or widely quarry rock, or generally produce metals in colonial days. Nor, if they had, would these be matters of much concern under the subject of "conservation" as here used. After all, oil, once pumped from the ground, cannot be restored; and conservation as herein discussed—and as popularly understood—concerns itself with "restorable" resources.

There is, of course, another kind of conservation problem involved in the pumpage, refinement and distribution of oil, the mining of coal, or the use of natural gas. It is not, however, within the purview of "conservation" as popularly understood.

But America's pioneers were forced from the hour of their landing on these shores to make use of, live near, and be influenced by the forests. For that reason—and because forests are, even today, the very center of the conservationist's attention—they are stressed in this and other essays. It was by and through the forests that the pioneers endured, and upon forest products that early America was builded.

But it is important that the student be warned against accepting forests, or forest use and perpetuation, as the sole and only concern of "conservation." He should understand that the soil, while beyond his field of study, yet is a natural resource and an important one; that waters, animals, birds, marsh life and certain subsidiary subjects—like scenic beauty, park development, landscaping, hunting, fishing, camping, touring, game propagation, fish culture—all come ultimately within his purview as a student of this new science of conservation.

The forests then, stressed in this essay, are so stressed because they were of paramount importance to early America;

and because upon their use and perpetuation depend many of the other so-called natural resources. As study progresses the relationship between forests and these other matters, and the relative importance of the others, will become apparent.

The crudest of log cabins were the first structures in America. Men still build a few of them, as crude, in the forests today.

FOREST INFLUENCES

When the Pilgrims came to the Massachusetts shore they came to a land of forests. They were poor folks—weavers and spinners, carpenters and masons, makers of pipes, clocks and hats, bakers and coopers and tailors—and they knew nothing about forests.

They had not lived among them in England; they had seen nothing of them in Holland, where only heartbreaking toil in cities had been their portion. So now, at Plymouth, in the new land, only the carpenters had any idea about how to cut and hew trees, build cabins, or fashion things of wood.

Even the carpenters had not used raw logs in England or Holland. They had worked with boards from the mills, sawed and planed into lumber.

Here in the new land were trees in the raw; trees covered with bark, laden with leaves and branches, and needing preparation before they could be used. Yet all hope of protection against possible Indian attacks and all hope of shelter from the weather, lay in the logs, standing in the forests as trees.

So the weavers and spinners, the makers of pipes, clocks and hats, approached dubiously, led by the carpenters. They swung unfamiliar

axes. They scrambled away before unfamiliar, tottering forest giants. They stood in awe as forest monarchs crashed heavily to the ground.

They managed to fell enough trees, lop off the branches, and secure enough logs to build a square house with a flat roof, thereon to mount six cannon. They managed to build a stockade around this building and thus make secure the first meeting house of Plymouth, wherein they might not only worship but find safety, should the Indians attack.

In that first year they also managed to build some cabins; yet they did not become forest

—Courtesy Milwaukee Public Museum.
But America's pioneers soon learned how to square logs, and build commodious and comfortable homes, as this museum reproduction of an early New England home makes plain.

minded. They clung to the seashore, searched on the beaches and in the sand for food, tried to gain sustenance from the creatures of the sea. History chronicles the result: Privation, starva-

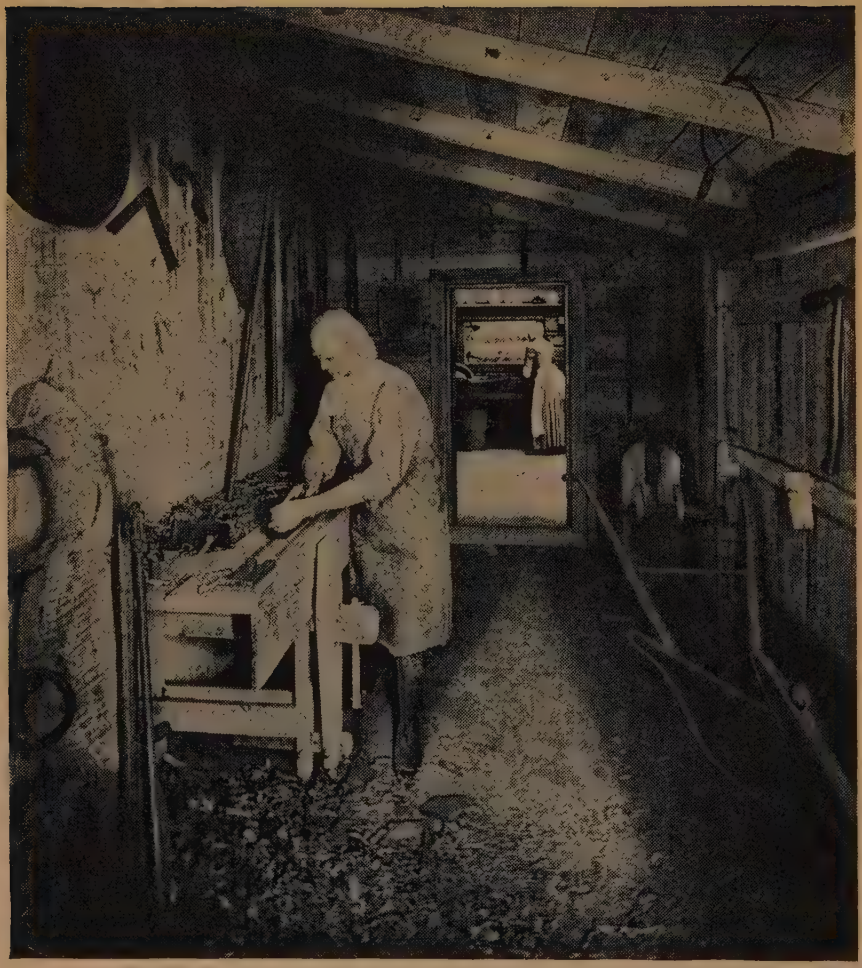
tion, sickness and death came to Plymouth colony and lingered until the Pilgrims turned whole-heartedly to the forests. Not until Chief Massasoit of the Wampanoags came to them; not until this "forest man" showed them the way to security, did the fortunes of the Pilgrims change.

That way lay under the trees. Game birds and animals were there, in the thickets. Nuts and berries ripened there, on the bushes. Fur-bearing creatures dwelt there and yielded skins for clothing. Warmth was there, in the fire-wood that lay endlessly about.

When the Pilgrims at last turned from the seashore and went to the forests, Plymouth began to prosper. And, incidentally, all the prosperity of the new America was, in the same way, based on the forest resources during the whole period of early colonization.

Learn to Use Wood

The Pilgrims learned to shape and square logs and fit them together to fashion sturdy and comfortable cabins. They became adept at shaping and carving wood. For they were artisans, after all. They had been weavers and spinners and makers of clocks, hats and pipes; their hands were skilled. And it was no great matter to turn this skill to woodworking, once the



—Courtesy Milwaukee Public Museum.

The workshop in an early American home.

The Pilgrims and other colonists soon were using wood for most of their needs. The workshop became an integral part of most early American homes. In these workshops the great yokes for the ox teams were fashioned from trees; the early plowshares were made; then the furniture and other fittings for the houses were sawed, planed and carved from wood, which came from the nearby forests. Those forests offered everything needed by early Americans—animals and birds for meat, berries and nuts as additional food, furs and skins for clothings, but especially timber to form homes and the comforts within them, in early villages. This workshop is made of wood, from its floor to its ceiling. Most of the utensils on the walls are of wood, therefore products of the nearby forests. In fact, early America was so largely fashioned of wood as to be unique in history. Perhaps in no other country was family and community life so wholly based on forest products as was the life of early America in colonial and even later days.

new and unfamiliar axes, draw shaves, saws and planes became familiar.

So the Pilgrims began making furniture. They fashioned beds for their cabins, with corner posts, head boards, tail boards and slats of wood. They made benches and tables. They soon were shaping spinning wheels and looms, even to carving the cog-wheels out of wood. In fact, wood use and wood working developed to a high degree in Plymouth, considering the primitive state of the colony. And it continued to develop in other American settlements until all of the new America was being sturdily fashioned of wood.

But wood—logs, timber, boards and fuel—were not the only resources that the forests gave, either to the Pilgrims or other settlers. Food, of course, came regularly from among the trees. Wild turkeys, shot by hunters, were served at the earliest Thanksgiving feasts and the turkey has remained America's thanksgiving bird ever since. Nuts and wild fruits, venison and bear steaks, wild ducks and geese, graced many a Plymouth table in days when the table would else have been bare indeed.

As important, almost, as these necessities, was the crop of furs provided by the same forests.

The Pilgrims had outfitted the Mayflower at the expense of merchants in England. They

had, in effect, pledged their colony and its future in return for this loan. They had agreed to repay their creditors by shipping them furs, taken in the new land.

They readily found the furs, on wilderness creatures that ranged everywhere in forests almost overshadowing Plymouth village. Once they learned to trap or shoot these creatures, their debt was on the way to repayment. Beaver and otter, coon and lynx, fisher, martin and mink gave their hides for the advancement of the colony. An apparently endless harvest of furs was at Plymouth's door and the Pilgrims made good use of it. They discharged the debt against them, in time, and thus won economic independence by the bounty of the forests.

Early Lumbering

So again it becomes plain that much of early American success was due to this richness of natural resources, this bounty of forest life, ready at hand for American colonists to use for their betterment and welfare. Nor was it long before all of the new Americans were "forest minded" in one sense—yet only in one.

Men from every settlement spent most of their time in the nearby woods. They cut down trees, squared them, hauled them to town. They were the first lumbermen. They employed

other men to help them and, before long a regular lumber business was under way.

Every town and city on the Atlantic coast needed that business and every one of them owed most of its principal comforts—especially the buildings that gave shelter and safety—to it and to the forests that made it possible.

Then another class of men went into the forests to hunt, fish and trap. Every tree seemed to have its bird's nest, every thicket its rabbit or quail, every pond its muskrat or beaver, every creek its fish, every hill and valley its deer, bear, moose or elk.

These men brought hundreds of birds, sides of venison, bear steaks, and moose and elk saddles, into the new towns. That gave the people much fresh food. They also brought furs. The fur industry grew more and more important because the furs could be shipped across the seas where they were eagerly bought, in England, France, Spain and other countries. Of course, all these things came from the forests.

However, it was upon leaving the Atlantic coast that the full worth of the forests became really clear to early Americans. On the coast the settlers always had ships coming, bringing goods in exchange for furs or other forest products.

Inland Forests Vital

But when men began to leave the sea coast and go inland, then the forests became vital indeed. Once away from ships they could turn only to the forests. So, in the Lake states, in the Mississippi valley, and on the Pacific coast, they lived almost entirely on forest resources.

They did it by using logs for cabins, as had the Atlantic coast settlers; then branches or small trees for furniture; then birch bark for canoes; then hickory for ax and other tool handles; then hard woods for plow shares and for wagon wheels and boxes; then skins from many animals for their clothing; then bark, as tough as rope, to tie up their horses; then all the meat they ate, from the ducks, geese, rabbits, deer, elk, moose and bear that ranged the woods; then hundreds of furs, to be sent back and sold or traded; in fact, virtually all the necessities of early life in inland America came from the forests.

Only after stage coaches began to come in, or boats penetrated by rivers or on the Great Lakes, or covered wagons moved over the early trails, did the goods of Europe or of the Atlantic colonies get to the men and women who lived in the forests of such states as Michigan, Wisconsin or Minnesota, or the inland forests of Pennsylvania, Ohio or Kentucky, or the more remote states of Oregon, Washington and California.

Nor did these inland pioneers suffer. Once they had learned where to look and how to get what they needed, the forests gave generously. Deer, bear, elk and moose; birds that swarmed the marshes; otter, beaver and muskrat from the lakes and rivers; nuts that grew in thickets and on trees; berries in the underbrush or, as in New Jersey or in the Lake states, blueberries on swampy grounds and cranberries in many marshes; all were generously provided by the forests of early America.

Water and Fish

So, while the pioneers were making clearings and building homes and barns and preparing to begin farming, they lived on the forests. At the same time they cut them down. They wanted room for fields. They slashed, burned and destroyed trees to get land cleared so they could plow the ground and raise crops. While the forests gave them shelter, food and clothing, they were slashing away the forests, because they wanted farms.

One more thing that the forests gave was good water. The clear lakes, pools or springs that bubbled under the trees were there because the forest floor held water and kept it clear and clean, fresh and pure, for men to use. All the early pioneers got the water they had to have, to live on, from forest-sheltered lakes or brooks, rivers or springs.

—Courtesy Milwaukee Public Museum.

The pioneers, living close to or virtually within the forests, soon learned to carve even their most intricate and delicate implements from wood. Here the women of a pioneer New England family are at work at the loom and spinning wheel, both made, in all their parts—including the wheels and gears—of wood, taken from neighboring forests. Again the room in which they work is built almost entirely of wood—its floor, walls, ceiling and roof beams sawed from logs, produced by the forests nearby. The chairs, stools, benches—the very spools, upon which is carried the home-spun thread—are products of the trees. This picture should give modern Americans insight into the tremendous importance of the forests to early America. And, while this importance no longer is as obvious as it once was, it still prevails. America, today, still uses wood more lavishly than any other country—and is richer and more comfortable thereby. But forests are not inexhaustible and "conservation" must be practiced if this generous use of forest products is to continue. This does not mean that forest use must cease; that men no longer must harvest trees, saw them into logs, cut them into timber and use them in buildings or elsewhere. On the contrary, it means continued wide use but it also means energetic efforts to grow new trees to replace those cut down. It means the proper practice of "selective cutting"—taking mature or "ripe" trees but leaving young trees undamaged. It means, too, the adoption of other forestry practices so trees will be produced as are other crops.

Then, of course, there were fish in these waters. The pioneers caught many of them and added much to their food supply. Even some of the great fish from the seas, like the salmon, swam into the seaside rivers and came far inland, where they were caught, and so helped to feed the settlers.

Every early American pioneer, from the Atlantic coast to the Pacific, from Canada to Mexico, lived wholly or largely on the forests or by virtue of them; and everywhere, all over the country, these forests provided for the needs of men who meanwhile swung axes and drew saws, cutting down trees that so richly were caring for this pioneer humanity.

So early Americans became "forest minded" in one sense: They consciously went to the forests and made material use of them. Yet the colonists did not understand what the forests were giving beyond logs, foodstuffs and furs. That a subtle forest influence was weaving itself into the very patterns of American life did not occur to them; that this forest influence was providing not only the material foundations for towns but also the foundation for a new American character seems to have escaped their notice.

The Subtle Influence

Yet it surely was doing that. The forests stood lovely and green on the Atlantic coast;

they mantled the slopes of the Adirondacks and the Alleghenies; they spread into Maine; they stood on the shores of the Great Lakes and deep into the Mississippi valley; they dotted the deserts and plains but towered again on the slopes of the Rockies; they were majestic and wonderful on the Pacific.

On summer mornings in Virginia or New York the sun filtered through endless branches; on winter days the snow drifted under New England's pines; on autumn afternoons by the Great Lakes, the somber spruces and hemlocks stood green against the purple, red and gold of the maples, ashes, poplars and birches.

Certainly, even the careless adventurer, Cabeza De Vaca, and his companions, as they floundered about under the trees in Florida must have been impressed—perhaps by a torrential rain beating on the leafy canopy overhead and descending like a gray mist through the interlacing branches; or perhaps by lightning, flashing through the tree tops, or thunder rolling over a sea of dripping leaves, or the sheer majesty of the green expanse through which they wandered.

Certainly Captain John Smith was halted, at times, by the beauty of a patch of sunlight filtering through Virginia's trees; and the Pilgrims, though simple folks, concerned rather

with problems of daily life and religion than with the forest beauty about them, could not have toiled daily under trees without being impressed by them.

Subtly the forests implanted something in Pilgrim hearts and minds that, though not evident for a number of generations, gradually asserted itself in their descendants.

Nor can it be supposed that other colonists, working in these forests, were uninfluenced by them. Groups of men everywhere, daily harvesting great trees, learned resourcefulness thereby and passed it on to future generations. Groups that annually tapped the maples for syrup, found memories lingering with them, of early spring-time in the forests, with the sap flowing. And men, trapping fur-bearing creatures, paddling canoes down forest streams, camping in forest cabins or under the boughs of hemlocks, gained forest lore and developed a forest philosophy that was left as a heritage for those who came after them.

A New People

Decidedly, the people who came to America from many lands were influenced by something more than each other. The resourcefulness, ingenuity, calm acceptance of hardships, and the quiet ability to overcome them were, in part at least, forest-induced. Slowly forest in-

fluence permeated this new nation and gave the world a nationally different people—venturesome, resourceful and competent, with new ideas.

Human influence alone did not engender these new ideas. There had been limitless human influences at work in every country in Europe. Human precepts, examples and codes had been drilled into every man and woman from England, France or other countries, who came to the colonies. Certainly these did not cause them to develop philosophies or modes of life wholly strange to Europe. Yet once under the subtle forest influence of America, they builded towns of logs, clothed themselves in furs and skins, built great fireplaces to warm their homes, fashioned whole towns of wood—nowhere in Europe, unless, perhaps, in the Scandinavian countries, were there any like them—and later laid board walks, plank roads, and corduroy causeways. They quickly developed methods of "conquering" the forests, new to the world. They ultimately learned so ingeniously to handle great trees—fell them, saw them into logs, square them and, finally, slice them into boards—that they had the most efficient lumbering operations, and most productive sawmills, in the world.

These ideas and practices, and many others, less directly associated, undoubtedly were born

of the forests. Of course, there was the urge of primitive necessity. Here was a raw land, with new problems, and in order to live the Europeans who had come to the new land had to solve the problems. Had the land been overlaid with granite instead of trees, with ore instead of forests, the colonists undoubtedly would have built of stone or of metal and shaped a different kind of America. But they also would have shaped different characters for themselves and their descendants—colder, harsher, less sympathetic characters, perhaps; more restricted, and restrained characters, possibly.

Forests Were Alive

Unlike granite and ore, the forests were alive. They offered more than materials; they aroused thought, awakened inspiration, induced endeavor and encouraged ingenuity.

Plunging forest torrents stirred men, first to interest, then to understanding, finally to a desire to harness their power. Natural dams, formed by fallen trees, were the inspiration for power dams—patterned after the dams of Europe, to be sure, yet patterned differently, too; more daringly, in time, than any Europe had built.

Towering redwoods or even the giant pines of Maine or the Lake states induced men to look upward and envision uprising structures.

—Courtesy Milwaukee Public Museum.

The living room in an early American home. Again it is shaped almost entirely of wood—from the great, hand-hewn beams in its ceiling to the broad boards on its floor; from the family dining table to the very cradles for early America's children. The stools, the chairs, the seat in the fireplace, the logs under the kettles, the very broom on the wall and most of the implements used about the home, were produced from logs or other tree-parts, taken from the forests. And to this table were brought wild turkeys from the same forests; raspberries, blue berries or cranberries from the forest marshes; ducks, geese, venison or bear steaks from the wildernes places; nuts from the hickory, chestnut and walnut trees; syrup from the maples. To the villages where these homes were builded, were brought furs from the same forests—and the furs were shipped to England and other countries, to bring, in return, such goods as America's forests could not produce.

Who shall say that the architecture of modern America was uninfluenced by the forests? Nowhere else in the world was there inspiration for it. Nowhere else were there twenty, thirty, fifty-storied buildings. No example for them came from other lands. But the sequoias of California, towering to the very skies; the pines of Maine; the spruces of Michigan—these were designed to implant exactly this idea in the minds of American builders.

Certainly, the idea did not come to the colonists, or to the Revolutionary fathers, or even to the framers of the constitution or the leaders of the early and young republic. But its seeds may well have been sown just the same, along with other subtle implantations. And as the years of turmoil and trouble passed and America's development began in earnest, these implantations germinated in the generations that followed and found expression in the works they undertook.

They dared beyond the daring of other peoples. They laid their roads and railroads over greater distances, flung their bridges over wider streams, spread their wheat fields over greater acreages, and let their imaginations aspire to greater conceptions than had other peoples before them.

They went inevitably into an era of such construction, invention, ingenuity and achieve-

ment as the world had never known. And it undoubtedly was the gigantic American forest and its influences, aided and modified by other forces, of course, that laid the foundation for these characteristics in Americans.

Early Writers Mute

Strangely enough, this forest inspiration—this seed, sown deep in pioneer hearts and minds by the earliest woodlands—was not recognized in early American literature. The earliest writers expressed nothing of it. Later authors and poets—Irving, Bryant, Poe, Hawthorne, Emerson, Lowell and even Longfellow—remained largely unconscious of it or at least uninspired by it. They wrote of city life, found themes in Europe or in the political situations about them, devoted much attention to urban and rural New England, or were influenced by the writers of the old world. Even Longfellow's "Hiawatha" cannot be accepted as an expression of understanding. Forests and Indians, to him, were alien; he wrote of them as a careful student but as one quite apart from them.

However, James Fennimore Cooper went direct to the forests for his inspiration and later Thoreau began, rather eccentrically, to express something of what the forests were implanting into American character. Still later Burroughs wrote of nature but hardly in direct acknowledg-

ment of forest influence upon America's people. In fact not until modern times—not until almost our own day—did American writers deeply feel and begin to express a national understanding of the impression that forest influences had made. From modern literature, however, page after page might be quoted acclaiming the forests and their benefactions. Perhaps Joyce Kilmer's much-quoted poem as well illustrates this as any:

I think that I shall never see
A poem lovely as a tree;
A tree whose hungry mouth is pres't
Against the earth's sweet-flowing breast;
A tree that looks to God all day
And lifts her leafy arms to pray;
A tree that may in summer wear
A nest of robins in her hair;
Upon whose bosom snow has lain;
Who intimately lives with rain.
Poems are made by fools like me,
But only God can make a tree.

The "Royal Surveyor"

However, though early writers may have missed the importance of forests to American life and character—and thereby suggest that the American people as a whole were unconscious of it—England's king appears to have had a faint stir of understanding in 1696. For he sent to New England a "royal surveyor of the woods."

His idea seems to have been to give some sort of guardianship to the forests, through this royal representative. However, any thought of forest perpetuation was so remote from the minds of the colonists that they promptly infected the royal surveyor with their own conceptions; almost from the first he seems to have accepted the creed that America's forests were limitless and inexhaustible. For, from the beginning, he used his authority rather to help define the boundaries of forest property, and assert the rights of owners, than in any way to restrain forest cutting or use.

At about the same time, or even a few years sooner, William Penn, governor of Pennsylvania, also faintly sensed the tremendous importance of forests to the welfare of his people. For he required of new settlers that they leave one acre in every five, in standing timber. Four acres might be cleared, he said, but then a fifth must be left unshorn of its trees.

Again the idea seems to have been considered so fantastic that the order was ignored. The people simply could not conceive of any reason why any forest tract should not be cut down and cleared out of the way. Forests were obstructions—wild growths in the way of agriculture; and, anyway, forests were endless, limitless, inexhaustible.

Yet these two endeavors—the king's attempt to give guardianship to forests through a royal surveyor, and William Penn's order to settlers —were the beginnings of conservation in America and perhaps, too, the first faint expressions of a consciousness that forests were a mighty factor in the lives of the people.

History, then, discloses that forests were, and are today, important for more than their timber. To be sure the United States would be materially poorer if timber no longer were generally available. A grace and richness would be missing from American homes and other buildings. But perhaps substitutes could be found. Stone, metal, other materials, might be used for all building purposes; corn stalks, perhaps, or other fibrous plants for paper manufacture; new sources for the chemicals, today extracted from wood.

But no substitute can be imagined for the strange influence that draws even modern men and women into the woodlands; that causes the most hardened metropolitanite to plant a tree by his doorway, or many trees and shrubs on his estate; that caused even the most stolid pioneers to stand in awe before the sequoias and more sensitive men to experience a feeling akin to reverence before spring's expanding greenery or winter's snow blanket laid on forest trees.

—Courtesy Milwaukee Public Museum.

Thus early Americans built whole towns of wood—wooden homes, fences, walks, well-sweeps, watering troughs, and even plank or corduroy roadways in many places. Nowhere else in the world—unless perhaps in the Scandinavian countries—was wood thus widely used to become the very foundation of national life. Nor could early Americans escape the tremendous influence thus exerted by the forests. As they became conscious of forest benefactions—as they must have become, on stormy nights when New England's blizzards roared against stout log walls; on biting days, when warmth radiated from logs on the hearth; on rain-drenched nights, when torrents poured above the sturdy roof-beams—something of appreciation and of gratitude toward the forests was implanted in their hearts. As America grew some of these feelings were passed to succeeding generations. The question is, has enough appreciation of the practical value, and the less tangible but equally important value of forest influence on American character, been developed by this historical background to insure necessary perpetuation of the forests by present generations? Unless it has, modern America may yet lose much, both materially and spiritually.

(The metal rail, visible in the foreground in this picture, is of course, a museum guard rail, not part of the village; it protects the exhibit, a reproduction of an actual early American village in New England.)

No substitute can be conceived for these things nor can paved streets, great buildings, crowded cities, radios, motor cars, airplanes or motion pictures replace them. Americans gained much of their stamina and resourcefulness from their forest background in colonial days and they need that background to preserve these characteristics today.

"Forestry"

Now, one of the branches of conservation is "forestry."

The practice of forestry has for its purpose the wise use and proper perpetuation of forests.

The science of forestry does *not* teach that forests should not be used; that trees should not be cut for timber; that men should stop making paper from wood, chemicals from bark, veneer from the birches, pencils from the cedars, or other useful things from the trees.

It does *not* teach that "you must plant a tree for every tree you cut down."

It does *not* teach that small spruces or balsams should not be used as Christmas trees; that no shade tree in any city should be cut; that no roadway should be built through timber, no clearings made in forests, no playgrounds among the park trees.

On the contrary, the desire of good forestry is more widely to use trees and tree products

but without thereby destroying all or most of the forests.

The intent of good forestry is to practice *tree culture.*

Tree culture, like rose culture, corn culture or potato culture, means to grow a crop for use, then regrow additional crops, indefinitely, for future use.

Tree culture means to so handle trees—by wise seeding, transplanting, protecting or cutting—that forests will produce more timber, more paper, more chemicals or more Christmas trees than ever.

The way to produce these products—in such abundance that every family can have all the wood, paper, chemicals or Christmas trees it may need, at reasonable prices—is to treat the forest like a cornfield or a potato patch. That is, to so plant, cultivate, nurture and protect it as to induce the best tree growth; then to so harvest it as to leave it ready to produce future crops.

The farmer does not merely cut or harvest corn; he also plants, cultivates and cares for his corn. And, having cut it down, he plants new seeds, in a newly prepared field, and nurtures them until they produce a new crop.

The good forester does not merely harvest trees; he also plants trees, or cares for young trees that nature has planted. He keeps fire

away from them; he sees that insects do not destroy them if he can; he protects them and keeps them growing lustily until they are mature or "ripe." Then he does not hesitate to cut them down. They are ready then, for the harvest, just as ripe corn is ready.

But immediately he proceeds to "grow" a new forest. It may be under the old forest; it may be of young trees, already thriving when the old forest was cut from over its head. Or it may be an entirely new and replanted forest. But by one of several methods he gives as much attention to growing young trees as to harvesting old ones.

He does not say, "You must plant a new tree for every old one you cut down," because that would be absurd. Some trees are misplaced, from man's viewpoint. They are in the way. They must be cut down and no new tree is wanted in their place. Some forests must make way for farms. It may be impractical or impossible to plant a new forest, of equal size, anywhere in the near vicinity. Perhaps the vicinity should not be planted to forests; perhaps it rather should be planted to farm crops. Therefore the forester does not teach that a new tree must be planted for each tree cut down. Instead he teaches that new trees, or new forests, should be planted, or allowed to grow, *insofar as they are needed and in places best suited to them.*

—Courtesy Milwaukee Public Museum

As the forests yielded crude cabins of logs they soon were yielding more spacious and attractive homes of finished wood. For early Americans learned how to saw trees into lumber, then how to shape lumber to their needs. Thus the forests soon gave America buildings like this one, reproduced after the original, in the New England states, by the Milwaukee Public Museum. It will be seen that shingles, siding, beams, even the dove cote, came from the forests as did the spinning wheel and almost all other interior furnishings.

Harvesting Only

Now, the difference between the modern forester and the colonists, the Revolutionary fathers, or the early Americans who came after them, is that the latter only harvested trees. They cut them down but gave no thought whatever to restoring them.

That was natural. There were innumerable trees—millions of acres of them. The supply looked inexhaustible; the store of timber held in the forests seemed so tremendous that the colonists, or the pioneers who followed them, believed they never could use it all.

Then, too, the trees were in the way. They stood where fields, meadows and farm homes were needed, for the nation's welfare and security. So the colonists and the later pioneers not only cut them down but burned them down; they not only harvested forests for timber but destroyed forests to make room for development.

They were right in both purposes. Timber was needed, the forests were its proper source, the forests therefore rightly were made to yield a harvest. Room for villages, cities, fields and farms also was needed; and, since the forests stood in the way, they properly were removed.

But, certainly, as men continued not only to harvest necessary timber and make necessary room, but also to harvest carelessly, wantonly

and recklessly; as they destroyed more than they needed to destroy and gave no thought to the consequences, they were shortsighted, unwise and wrong.

Men continued to do this for many years after colonial days and early Independence days had faded into history. In fact, men have continued to do it up to the very present. They have cut trees recklessly, without thought of restoration. They have deliberately burned trees —or have permitted haphazard fires to burn them—over wide areas. They have so wantonly continued not only to use, but to destroy, the forests as actually to threaten their annihilation.

And therefore "forestry" has stepped in; therefore this new science has developed, to teach wise use and reasonable restoration, instead of reckless use and relentless destruction.

Forestry, then, teaches wise use. It teaches how to treat the forests as any growing crop is treated; how to cut timber from them, yet leave thrifty young trees undamaged; how to check fires; how to care for a denuded tract—an area shorn of its forests—so it may replenish itself; how to gather tree seeds, plant them in a "nursery," nurture them for a year or two, then transplant them to forest areas.

Forestry has developed a group of men skilled in these and other forest practices. These men gradually are gaining authority over some

forest tracts—the great tracts that now are set aside as "national forests"; smaller tracts, set aside as "state forests" by the various states; and considerable private tracts whose owners no longer are willing that their forests be merely cut and destroyed but desire that they be perpetuated, so they will produce one crop after another, indefinitely.

These foresters include scientific men whose chief duty is to study forest needs. They may be located in cities, spend their time in laboratories, rarely get into the forests proper. They provide the scientific or theoretical knowledge needed successfully to grow forests.

Other foresters work in the forests themselves. They supervise lumbering operations, "select" the trees that shall be cut, decide how remaining trees shall be treated, designate where nursery trees shall be planted, and supervise fire fighting units or fire prevention activities.

The largest number of these foresters still is in the employ of national or state governments. The reason is that the people, especially those who own or control forests, are not yet willing to protect or preserve forests. Only government has, as yet, set aside really large tracts for forest growth. And since forest practices must be voluntary—since forests are private property and can be treated in any way the owner desires—the foresters can do their work

only where owners desire that it be done. That means, for the most, on government reservations —in national or state forests.

So, though gradually private tracts also are being given over to foresters, a part of the work of forestry still is "educational"—that is, foresters and others interested in forest perpetuation still must devote much time to urging private owners to treat their forests with care.

In the last 15 or 20 years government—state or national—has been doing more and more for all forests, not only those in national or state reservations. Thus the state of New York has been planting extensive nurseries, and has been giving away, or selling at cost, millions of nursery trees in an effort to encourage reforestation. Thus many states have fire fighting organizations—wardens who understand how to prevent or check forest fires. These organizations fight fire regardless of whether it burns on public or private land.

Then, too, several states have enacted special tax laws to encourage tree growing, and other measures to aid private forest owners to practice forestry.

The federal government offers federal aid to the states in the form of money—contributions, paid if the states themselves properly control forest fires or engage in some other forest practices.

The same federal government has opened forest experimental stations, where experts study tree growth, local forest needs, the best lumbering practices and other similar matters; and forest laboratories, to study wood uses and intricate forest problems.

But it is not the purpose here to offer more of these details. The forestry organizations are discussed in a later essay. Suffice for the reader that out of the uses and misuses of forests by the colonists and the later pioneers, and finally by the people of yesterday, has grown a rapidly spreading conviction that forests must be protected—not with a view to taking them out of use but with a view to keeping them continually useful.

The science of conservation teaches men first why they should widely, but more wisely, use natural resources; then how to do it.

This science of conservation, of which one branch is forestry, gets no shock when a tree falls, experiences no horror when men cut down even noble forest monarchs or wondrous spreading shade trees in their city streets. It recognizes that forests or single trees must be used or must, under circumstances, be removed.

But it recognizes, too, that these uses and removals can be compensated for—the forests, or the single trees, can be replanted or replaced

by natural replantations; and that men must give as careful attention to these replacements as they do to the harvests they take from the forests.

QUESTIONS

1. What are some of the important "natural resources?"
2. Upon which "natural resource" did early Americans most largely depend?
3. Why?
4. After the Pilgrims suffered privation, trying to sustain themselves on the seashore, where did they turn and with what results? Describe fully through what agency, and how, Plymouth colony began to prosper.
5. What "cash crop"—or product used to pay creditors or sent to England in return for goods—did the American colonists get from the forests?
6. Describe America's "first lumbermen"—who were they and why did they begin lumbering?
7. In what way were the "inland forests" especially vital to settlers? Why more vital than the forests on the coast?
8. What subtle influence did the forests exert upon early Americans? Describe the forest scenes, or "atmosphere" that probably helped to shape American character. What characteristics did the "new people"—the Americans—begin to show?
9. What early efforts were made to protect American forests? What did the people think about them?
10. What is "forestry." Does it teach that trees must not be used? If not, what does it teach about the use of trees?

Themes for Compositions or Recitations

Write a composition (or recite)
on one of the following topics.

TOPIC No. 1

Carefully study the pictures illustrating chapter 2 of these essays. You will note that all the pictures depict early American life.

1. Read the inscriptions under the pictures. You will find that they point to an outstanding characteristic in early American homes. What was that characteristic?

2. Now explain how early Americans probably got the lumber, or wood, that they used. Use your imagination—what would you have done, in an early American colony, with an ax, some hand saws, some draw-shaves and planes, perhaps, but no ready-made lumber? Describe this earliest lumbering operation.

3. Now study the pictures again, then write about, or orally describe, as many objects as you can find, made of lumber or wood. Explain the benefits gained by early Americans thereby and describe their probable difficulties if they had not been able to get this wood or lumber.

4. Now look about you wherever you may be—at home, in the school room, on a city street or anywhere else. Then answer this question: What common things still are made of lumber or wood and are as widely used and as vital to men today as they were to the early Americans?

TOPIC No. 2

Carefully re-read the last paragraph on page 19, and all of pages 20 and 21 of chapter 2.

1. Now write a 500 to 750 word description of the early American forests *in your own words.*

2. Remember the changing seasons—the budding green of spring; the cool shadows of summer; the amazing colors of autumn; the silent white world of the winter.

3. Remember, too, that forests are not just trees. Other vegetation grows in them, as you have seen in every woodland; and certain creatures dwell under or in the trees. These were especially abundant in the early forests. Describe them as you think they existed.

4. Then explain how the forests probably influenced early Americans and how they helped mold American character.

Coming down! Young black bears in Jasper National park, in Alberta, Canada.

(Acknowledgment is made to the Canadian government which, through the Canadian National Railways, provided many of the unusual pictures reproduced herein.)

CHAPTER 3

A. Creature Conservation

(3) Animals, Birds and Fishes

CREATURE CONSERVATION

"Creature conservation" deals with the *active* life of the forests and waters. It functions in the hidden-most recesses—the silent places—the eerie depths of the swamps and thickets.

It properly may go there without extensive technical or scientific knowledge. Its interest is in animals, birds and fishes in *groups*. Its concern is with loose classifications like "game animals," "fur bearers," "song birds," or "game fishes."

It does not strive to enter the fields of the zoologist, ornithologist or ichthyologist, or even to recognize and name many animals, birds and fishes.

Its business is to understand the characteristics of wilderness creature *in general,* and the conditions that best are suited to their needs.

It must, of course, know something about creature traits, else even the broad work of conservation will go astray. Thus it must understand coyotes if it properly would determine what to do about coyotes. It must know the general habits of hawks, owls or garfish to decide whether to preserve or destroy these creatures.

Yet even here it not only may, but decidedly should, call in the specialist. For the primary business of this conservation is wisely to protect or, in instances, to destroy certain creatures. Before destroying, it is in duty bound to seek expert, scientific counsel.

So, while the practical conservationist is not expected to be a specialist in each of the branches of biology, he must have some understanding of simple creature requirements—the browsing needs of deer, the feeding necessities of birds,

the living conditions of mountain lions or gray wolves, for instance.

Unfortunately, even these fundamentals were not considered important by some men who, in the past, have had a part in determining the destiny of the wild things. They decided on slaughter or protection with no more to guide them than casual and inexpert observation.

Seeing an eagle pounce upon a lamb they concluded that lambs are the chief diet of eagles, eagles are arch enemies of the flocks, and eagles must be annihilated.

Noting a temporary and local decline in some creature, they urged, or helped enact protective laws, sometimes without good purpose or desired results.

Men have erred mightily in their conclusions about animals, birds and fishes and some of America's greatest wilderness tragedies have been enacted because of these errors. In contrast, some comedies also have been enacted. Thus mice moved into men's barns and granaries—into their very homes—taking up comfortable residence under their feet and looting their larders, as men killed off their enemies, the hawks, owls and foxes.

While men exterminated the buffalo, the comparatively destructive wolf eluded them and waxed fat. While men wiped out the passenger pigeon, the crow cawed his defiance and continued to plunder their cornfields. While many fine song birds disappeared, English sparrows deliberately were imported into the land.

As men have attributed, to the wilderness creatures, vices that do not exist or are offset by virtues, so have they attributed intelligences and abilities to them that are quite beyond their capacities.

A mother bear, grunting along behind her cub, is "talking" to him at length—perhaps telling a bedtime story.

A bird, dead and entangled in a string, is a bird-criminal that duly was punished by hanging, by his fellow-birds.

A beaver, dragging aspen logs to the depths of his pond and keeping them there, "sucks the air out of the logs so they cannot float."

A decrepit old wolf, no longer able to hunt with the pack, retires from active wolf-life and devotes his declining years to teaching young wolves—or bob cats, mountain lions or foxes—the lore of the forests.

Such yarns have been heard by every naturalist, told in all sincerity and with a firm belief, by men who actually take part in shaping the destinies of wilderness creatures!

Pure fiction, of course, is another matter. Good animal stories, honestly presented as fancies—fairly offered as fic-

A group of Virginia deer, surprised in their sanctuary where they are thriving under good "creature conservation."

tion and nothing else—are among the delightful riches of literature. But there is sore need for better general knowledge, fostered by informed conservation.

Such conservation proposes creature protection to the same degree that it proposes forest protection. It would

wisely use and sensibly perpetuate a reasonable number of useful and interesting wilderness creatures.

Informed conservation recognizes that civilization must advance and that wild things must retreat before it; that the great hosts of animals and birds compatible with a wilderness country cannot be tolerated in a developed land.

So sound conservation does not undertake to protect and perpetuate every animal, bird or fish. It recognizes that man must, to a degree, select the creatures that shall live or die, else he would be overrun by them.

However, sound conservation insists upon careful study, by skilled observers and qualified scientists, before extensive slaughter or general annihilation is undertaken or permitted. It seeks to protect all natural creatures in areas where they do no damage to man. It urges that all creatures are interesting, many valuable, and some vital to man's existence.

The birds, for instance, probably make agriculture possible. Without them it is a question whether men could combat insects. Without them—and without some of the minor predators like the skunk and even the bear—it is doubtful that the hordes of creeping and crawling things, that ever threaten to overrun the earth, could be checked.

Man does not yet accurately know how much or little he is dependent upon wilderness creatures. Up to the present day many of them always have been near him. He has accepted their services without measuring them. He cannot definitely gauge their worth unless he permits them to be taken from him. That would be a dangerous experiment.

For man is reasonably certain that the destruction of all forests would destroy the earth as a habitat for man. Its surface would dry up and thus no longer would sustain life. He is less certain that the destruction of all birds, for instance, would bring about this destruction of the forests—whether insects promptly would strip them to the very

roots, or whether man himself could protect them against this fate.

He is in even greater doubt about the relation of the bear, deer, mountain goat, elk, moose, wolf, fox, skunk, weasel or gopher to human life. Perhaps man alone is sufficient to vitalize the earth and perhaps he, alone, could perform the functions of the lower animals—whatever they may be. But to make the test would be a dubious and hazardous undertaking.

So conservation proposes to preserve a reasonable number of wilderness creatures for these reasons alone.

But conservation also advances the proposition that most animals and birds have a sentimental value too fine to be lost. The bird songs of the countryside—the call of the robin in the morning, the twittering ecstasy of the wren, the plaintive voice of the meadowlark, the infinitely sweet carol of the vesper sparrow—are priceless tones in a raucous world. Men must not be permitted to silence them.

Nor are the graceful flights of the gulls, the smooth darts of the bluejays, the colorful flashes of orioles in orchard trees, to be lightly held by clumsily moving mankind.

And the greater creatures—the majestic moose, haunch-deep in the muck of a wilderness lake; the buck deer, in flight across a tangled windfall; the mountain ram silhouetted on the crags—yield pictures whose beauty alone should insure their preservation.

Nor are the tireless hunts of the wolf packs, the nerve-tensed crouch of the pumas, the plummet-drops of the eagles, or the fearless attacks of the weasels and ferrets, without fascination and a certain inspiration for men. After all, even these predators—viewed as cruel killers by most men and cordially abhorred by some—are persistent toilers of the wilderness. They endure hardships, including starva-

tion. They know disappointments such as men rarely experience—the disappointment of food, set before their yearning eyes, yet escaping their hungry clutches. They meet such disappointments with a seeming philosophy—at least, go on and on, to try again and again, before they gain their ends. Of cruelty they probably know nothing. They kill to live. They follow nature's mandate: "Hunt your sustenance! Strike it down as instinct directs and empty belly insists."

There is a persistency about them, a fine co-ordination of mind and muscle, a kind of courage for struggles against odds, that well may arouse man's respect. They are as much nature's children as the downiest nestling or most timid fawn. The nestling, too, will hunt the lesser creatures in his time—insects, to be sure, instead of deer or sheep or rabbits, yet equally made prey of; and the fawn will "hunt," attacking vegetable creations instead of animal, but thereby no more innocently destroying so that he, thereby, may live.

Thus creature conservation is an effort, first to understand, then wisely to perpetuate, for good uses, the natural animals, birds, fishes and some other forms of wild life.

This preservation may be undertaken to provide furs, good hunting, or insure benefits like the protection against insects provided by the birds; or it may be—and in part always should be—undertaken to retain for mankind a certain sentimental contact with active wild life, for no better reason than that mankind may be stirred by its songs, its problems and antics, its comedies, tragedies and battles, and its relentless struggle for existence.

ANIMALS, BIRDS AND FISHES

When the first explorers came to America's coasts they found a feast spread before them—literally "from soup to nuts."

On the shores were terrapins or sea turtles to provide the soup. The rivers contained the fish course. Wild turkeys or deer were at hand to supply the roast. Any blueberry or cranberry bog contained the dessert, and the nuts were on the hazel bushes or the hickory trees.

Early America abounded in animal, bird and fish life. It is only necessary to consider that early Spanish adventurer, Cabeza De Vaca, to be sure of that.

De Vaca and three companions were lost in the forests of the southern United States for ten years. They entered those forests practically without provisions. They had only crude and cumbersome weapons. They had no knowledge of woodcraft and but little of wilderness hunting. Yet so bountiful was American wild life—so numerous the birds, furred creatures, larger mammals and fish—that De Vaca and his men managed to live from the first; and to live abundantly, considering their situation, for ten years thereafter.

Not a bite of bread did they get in all that time; not an ounce of cultivated grain unless it

was an occasional ear of maize from the Indians' scattered plantations; not a pound of domestic meat or tablespoon of sugar; not a pinch of salt, tea or flour. Yet they not only existed, but lived well. Wilderness creatures supplied their meat and guided them, probably, to the wild rice, nuts, edible roots and fruits of the forest, that incidentally helped to sustain them.

And when, after ten years, these wanderers came at last to a little Spanish settlement on the coast of Mexico, they were not haggard and starved, but well fed and hearty.

So it is clear that early America literally swarmed with wild life—with all the numerous creatures, from fish in southern waters to moose in Maine's woodlands; from field mice in wild meadows to bison on the plains; from humming birds amid the blossoms to eagles soaring over the Rockies.

It was a teeming land—a paradise for the naturalist, of whom history records but few; and for the adventurer, explorer, hunter and the reckless and wanton killer, of whom history records many.

When De Vaca arrived at the Spanish settlement he had, of course, much to tell about these many creatures. But he was uninformed and they were strange to him. He could not name them, had no knowledge of their traits, and even his descriptions of them were fantastic.

But, among other creatures, he described a strange, cow-like animal with massive head, heavy shoulders, shaggy fore-parts and a humped appearance. These animals he had seen during the last of his wanderings—after he finally had gotten out of the forests. They had appeared in great herds on the open plains. They had grazed within his easy eye-range and

A loon leaving the water. This is said to be one of the best action pictures ever made of a loon.

he had seen them in such numbers as to doubt his eyes.

He was, of course, describing the American bison, or buffalo, that then ranged from Canada to Mexico—from the Great Slave lake to beyond the Rio Grande; from Oregon to the Ohio valley and the Great Lakes.

How great its numbers in De Vaca's day—about 1535—or in the seventeenth or eighteenth centuries, is largely a matter of conjecture. That

eight or ten million head ranged over about one-third of the United States is a reasonable supposition.

No definite figures are available for earlier years than 1871—a comparatively recent date. For that year William T. Hornaday, naturalist, estimated that "the great southern herd" contained about 3,500,000 animals and the northern herd about 1,500,000—a total of 5,000,000.

But, of course, much slaughter had preceded this date. The Great Plains had been invaded by increasing numbers of pioneers. The west had been reached and largely populated by waves of settlers. The bison already had fallen by the thousands. So the probable previous maximum had been much higher than the estimate by Mr. Hornaday for the year 1871. Yet even of 1871 he says: "In those days mighty hosts of buffaloes frequently stopped railway trains and obstructed the progress of boats on the Missouri and Yellowstone rivers."

In those days, and in previous days, the thundering herds moved northward and southward in bands that covered the land as far as the eye could see. They wore trails into the plains that remained for years after their demise. They pounded across the paths of the pioneers, blocking their covered wagons; they stopped not only boats and trains but everything else that sought to cross their ways. Probably nowhere, in any

other land or at any time, was there such a panorama of wild life, such extravagant abundance, such a mighty host of noble creatures, apparently possessing the open spaces to their very horizons.

Yet man wiped them out in about 15 years of organized slaughter! He engaged in such an orgy of killing as literally to make the plains run red.

Perhaps never in history was there such an example of human recklessness with wild life, human relentlessness toward the lower creatures, or human greed for flesh and hide.

Men killed single bisons to get one small steak. They slaughtered 2,000 pound bulls to

A rock rabbit—one of the curious little creatures that live in the high and inaccessible places in the mountains.

take no more than their tongues. And in their hunt for hides, to be made into buffalo robes, they killed in such wholesale lots as to leave the prairies dotted with carrion for miles.

It is estimated that for a number of years about 2,000,000 buffalo robes reached the American markets annually. They sold, for a time, at about $1 each. The buffalo meat was left to rot on the plains, the bones to bleach in the sun.

In 1883, the last thousand head in the northern herd were killed in southwestern Dakota by Sitting Bull and about a thousand of his braves from the Standing Rock reservation. Meanwhile the southern herd had so nearly been annihilated that C. J. Jones—"Buffalo" Jones—hunted down the remaining survivors in the Texas panhandle and captured most of them to save the species from extinction.

This slaughter of the buffaloes is important to the student of conservation because it illustrates how far men, unrestrained, will go; and because it aroused enough naturalists and others in the United States to inaugurate "creature conservation" in the country.

After the years of organized extermination, from about 1870 to 1883, these naturalists saw the species sink to its lowest ebb. In 1889 only 635 head were running wild in the United States while only 256 head were in captivity. But then the New York Zoological society gathered numbers of the animals and began to protect them in reservations. Other associations and individuals began to demand governmental protection in

preserves that would offer shelter and permit multiplication.

These activities, and these demands upon government, were perhaps the first well defined creature conservation activities in the United States.

They were not, at the time, called "conservation"; nor were they designed to become the

A Canada lynx, one of the "killers," or predators, yet interesting to watch and study.

basis of any "science of creature conservation." Rather they were a sporadic endeavor to save the last remnants of one wilderness species whose extermination was imminent.

Restraints were demanded and accorded by government in the form of prohibitory laws.

That laid the basis for later conservation. It still is in laws—in wise regulation of killing, with protected areas called preserves or reservations for shelter, and the assignment of proper officers to see that the regulations are obeyed—that creature conservation finds its field.

Incidentally, this first creature conservation was successful. The buffalo herds protected in Yellowstone park and on other reservations, have thrived. The herds of "woods buffaloes" in Canada have become formidable. The buffalo has been saved from extinction and the story of this endeavor is worth reading in works on natural history.

But a word of caution here is needed: Sound conservation, had it prevailed in 1871, *would not have attempted to save the great herds!*

The United States could not, today, have 10,000,000 buffaloes trampling upon its wheat fields. No sane conservation program would dare to propose it.

In fact, these herds are typical examples of "abundance of wild life, compatible with a wilderness country, but not to be tolerated in a developed land." Sensible conservation would not have tried to preserve them; but—

Conservation would have insisted on their orderly disposition. Instead of wanton slaugh-

ter, conservation would have provided regulated killing. It would have permitted hunting—even market hunting, perhaps. But it also would have had regulation, with insistence that the thousands of skins, tons of meat and endless bones be properly put to use.

Conservation would have rounded up the buffaloes, as the Great Plains became occupied by ranches, farms and towns, and driven them to selected wilderness ranges, there to persist and multiply.

Though the herds still would have been reduced, had conservation as a science been under-

A black bear pre-empts a trail in Jasper National park in Canada —always an interesting creature to tourists.

stood some 60 or 70 years ago, the reduction would have been orderly, not reckless. It would

have been cautious, not wanton. And Americans today would have buffaloes, not merely as zoological specimens, confined in paddocks or reservations, but on ranges, to be enjoyed in natural state; perhaps even to be hunted by modern sportsmen, under due license and proper regulations.

That is the difference between unrestrained disposition by the people, and ordered disposition by informed conservation.

That is "creature conservation."

It bows to the demands of humanity; it does not deny the right of civilization to expand and possess itself of much of the land. It admits that wilderness creatures must, perforce, yield to this pressure. But it demands orderly reduction instead of annihilation; regulated killing instead of unrestrained slaughter; and the preservation of a remnant at least—and of a generous basic stock whenever possible—for the sake of the sentimental value of all wild creatures if for no other reason.

The Second Tragedy

Paralleling this bison tragedy America witnessed another wilderness drama. Its actors were the passenger pigeons.

They, too, abounded. They moved in tremendous flocks, largely up and down the Mississippi valley, often around and even across the Great Lakes, with their focal point in Ohio.

As the flocks moved they darkened the sun like passing clouds. As they settled they covered acres of ground. As they roosted in the trees the branches broke under their great numbers.

This abundance again set men to wanton slaughter. The birds were slow to take wing, clung stupidly to their roosting places, had little of instinctive fear or caution. Men could slay them with clubs or capture them in nets. They could kill a score with a single charge from a shotgun, as the close formations flew overhead. They could take thousands of young, just ready to fly, from the nests.

They did all of these things. They slaughtered the pigeons by the millions. They packed them in boxes or barrels and shipped them to the markets. They carted them off by wagon loads and fed them to the hogs.

In the midst of this slaughter the voice of protest was raised. So, in 1857 the Ohio legislature was induced to appoint a "select committee" to study the birds and recommend necessary legislation, if any. The committee engaged in the kind of casual and inexpert observation referred to early in this essay. It apparently looked at flocks of pigeons overhead; at roosting sites yet densely populated; at numbers of the birds yet feeding on the ground in places. In its blindness it could see no declines. It listened

to men who also had seen large flocks without noting their gradual diminution; and to market hunters who wanted no legislative restrictions. Then the committee reached its conclusions. Here they are:

"The passenger pigeon needs no protection. Wonderfully prolific, having the vast forests of the north as its breeding grounds, traveling hundreds of miles in search of food, it is here today and elsewhere tomorrow, and no ordinary destruction can lessen them, or be missed from the myriads that are yearly produced."

Twenty-five years after this report was written, the pigeons had disappeared. They vanished with astounding suddenness. One spring the great flocks failed to appear at the rookeries. The men who awaited them with clubs and guns waited in vain. Then word came that they were not on their usual feeding grounds, either; and that none had been seen on the Mississippi or the Great Lakes for months. They were gone.

Men couldn't believe it. Then they speculated on possible causes—a great storm, perhaps, had drowned them in the lakes; or a wind had battered them against the bluffs or beaten them to earth.

There is no shred of evidence that any of these things happened or that the pigeons migrated to a safer land. They simply had been slaughtered out of existence.

Not every last bird vanished with the flocks. Careful observers continued to report isolated groups or single specimens for a number of years. Then no more were seen. For some time the species was considered extinct. But from about 1890 on, one or more of the birds were noted; and apparently competent observers continued to report them, including at least one observation in 1930.

Whether or not enough of the pigeons escaped to restore the species, their history predicts the fate of any wild thing left to the mercies of men, unrestrained.

A moose parade near Fort George, in British Columbia. "Creature conservation" is trying to preserve the moose.

Fish Destruction

The third wilderness tragedy of importance to conservationists has been enacted so many

times that it is not necessary to be specific. Any of the rivers where fish once abounded could tell the story.

Each spring some species of fish swim up the rivers in immense numbers to spawn in the upper reaches. The salmon, of course, come from the sea to do this. Many inland fish leave their lakes to seek outlet or inlet streams. Pike and other kinds of fish move from the Great Lakes to enter bays and swim up rivers if they can.

When early Americans discovered this habit they promptly made for the streams during these spawning migrations. They lined the banks, captured the fish in nets, speared them as they hurried by, slew them by the thousands. Again there was tremendous waste of wild life. Fish were taken, not merely for food, but in basketfuls and wagon loads, to be dumped in poultry yards and hog pens.

Nor was this practice confined to early Americans. Up to the present time—except where creature conservation now insures protection—when the fish seek their spawn beds they are forced to run a gauntlet of men, women and children, lining the stream banks, capturing thousands, thereby destroying not only adult fish but millions of potential fish in the form of spawn carried by the females.

Thus history discloses the tragedies of the animals, birds and fishes. Everywhere wilderness creatures, from humming brids to condors, from rabbits to caribou, swiftly were destroyed while men were permitted to do as they willed with them.

The primitive instinct to kill seems to prevail despite civilization's influences. Even today every community has enough of it to wipe out the last vestige of neighborhood wild life unless sternly repressed by law.

For that reason the first step in creature conservation is *regulation.*

Rocky Mountain sheep, an interesting species of mountain wild life, urgently needing good protection.

Laws as Remedies

Regulation means laws. Creature conservation begins by sponsoring good protective laws.

It secures them first by appealing for support to the thoughtful people of the community; then by urging them upon legislators; then by lobbying for them.

A set of good regulatory laws—national, state or local or a combination of the three—is the foundation upon which all creature conservation is builded.

Having secured the laws, this conservation demands their effective enforcement. It does that by insisting on the employment of good men by federal, state or local government, to see that they are enforced.

When government—federal or local—has enacted laws and appointed men to enforce them, it must make appropriations to meet the expenses. That means it must set up a department or agency and this becomes a conservation agency. Such agencies are among the visible forms which conservation has taken in the United States.

Thus "creature conservation" is the endeavor of government to control the fate of wilderness creatures by laws. Its forces are governmental agencies administered by officials who see that these laws are obeyed.

But, of course, creature conservation is broader. It is any endeavor by the people to protect, propagate or wisely control their wild

life. When it is organized and orderly, it is the science whereby men, in public or private life, by governmental activity or private research or practice, seek to keep an abundant wild life about them.

The development of this science may be summarized as follows:

First: Men found a superabundance of wild life in the United States. They began reasonably to hunt it for food, then recklessly to destroy it—partially to protect their crops and domestic creatures; partially to escape annoyances; partially in sport; partially to indulge a mere wanton desire to kill.

Second: A few people protested. Their first protests were without direction, being addressed merely to neighbors. But groups formed and cast about for an ear to hear their demands. They found it in government. Their selectmen, supervisors, aldermen, state legislators or federal representatives listened.

Third: These officials decided that the remedy lay in laws, and such laws were enacted.

Fourth: Agents were needed to enforce the laws—actually to stand guard over the wilderness herds and flocks. They were appointed. Administrative officers were needed to direct the work and as these also were appointed, conservation departments or bureaus were formed in the national, state or local governments. Gradually the laws were expanded until game preserves, bird refuges and fish hatcheries were established.

Fifth: Interested men and women banded together—some, like the Audubon societies, to urge better protection

for birds; some to foster the welfare of elk, moose or deer; some, like the later Walton leagues, to seek not only good protection but reasonable hunting and fishing. Women's clubs favored restraints. Hook and line fishermen advocated improved methods of propagation and the restocking of lakes and streams. Commercial fishermen proposed measures to increase their catches and, not infrequently, opposed restrictive laws. As these organizations provided accurate information and aided in finding solutions for the problems of wild life they helped make "creature conservation" a science.

Sixth: Zoologists, ornithologists and ichthyologists made studies and suggestions for creature welfare and thereby built important parts into the structure that now is the science of creature conservation.

Thus was this science developed and thus does it stand today. It is largely in the hands of federal, state, county and local officials who have become specialists. They are variously known as conservation commissioners, superintendents of fish or game, game wardens, and by other designations. They have become a small army in the service of the various units of government.

The Greater Army

Behind them is a greater unofficial army, made up of associations, societies and individuals—the bird, fish and game protective leagues, the women's clubs, and a considerable body of unattached citizens interested in wild life and watchful of its welfare.

Arrayed against these forces is, of course, that other considerable body of citizens whose disposition still is to kill without restraint—for illegitimate profit, to indulge an appetite for game dinners, or merely to give rein to the impulse of slaughter.

Sound conservation does not countenance this reckless killing but neither does it agree to intolerant prohibition. Deer, for instance, might become very numerous in a district. To then continue rigid protection would be to inflict a needless and perhaps destructive number of deer upon the community. It also would be to protect deer to no good purpose since, beyond reasonable numbers, they can add nothing even to aesthetic or sentimental satisfaction.

Thus, though a surplus well may, and should, be produced, that surplus then should go into beneficial use.

That its sacrifice on the hunting field, for instance, would be beneficial use may be denied by many but emphatically will be asserted by hunters and sportsmen. Conservation agrees with the sportsmen. It recognizes that it is as reasonable to take *surplus* wild life by licensed and controlled hunting as to take the lives of surplus beef cattle for human purposes.

However, good conservation makes sure that there actually is a surplus. Among most

wilderness creatures in the United States today there rather is a deficiency. The trend of conservation, therefore, is toward increased protection rather than greater liberality in the matter of hunting. Bag limits are being reduced, hunting seasons shortened, and complete protection is being accorded some creatures.

That is the right course. There must be adequate protection before there can be greater use. But once a surplus is established, conservation must put the excess into useful fields, whether they be zoos, museums, public parks, or the hunting grounds of the sportsmen.

Meanwhile Americans well may yield to the intangible appeal of the wilderness creatures that is sensed by the heart rather than by the practical mind. E. H. Forbush well expressed it when he wrote:

"Years roll on, youth passes, the homes and woods of our childhood disappear, the head becomes bowed with sorrow and frosted by the snows of time, the strong hand trembles, the friends of youth pass away; but with each returning spring the old familiar bird songs of our childhood come back to us, still unchanged by the passing years The birds turn back for us the flight of time. Their songs are voices of our vanished youth. Let us, then teach our children to love and protect the birds, that these familiar

friends of their childhood may remain to cheer them with song and beauty when, toward the sunset of life, the shadows will grow long upon the path."

As birds thus cheer and comfort us, so red fox, trotting through autumnal fields, lends color to our lives. So golden days on trout streams, or moonlit nights in forests, where gray wolf hunts, give solace when we're troubled. The great owl's call, the puma's cry, the splash of bass or tread of moose, stir lingering, primordial memories. They yet lie deep in every human heart. And it is for these—and for the infinitely appealing voice of the wilderness that yet speaks to us—that creature conservation guards the trails.

QUESTIONS

1. What is "creature conservation?"
2. Does the sensible "creature conservationist" insist that all animals and birds must be protected, none destroyed, all left to overrun men's farms, homes or cities?
3. What are "predatory creatures," or "predators?"
4. What good purposes may predators serve?
5. How do birds help to protect or perpetuate forests?
6. Did early American explorers find an abundance or a paucity of animal life?
7. About how many buffaloes or bisons ranged the American plains in 1871? What did man do to them? How long did it take to do it?
8. What has "conservation" since done for the buffaloes?
9. What did men do to the passenger pigeon? Is the species now extinct or nearly so? (See note below.)
10. By what means is America now attempting to save its wilderness creatures?

NOTE: It is generally believed that the passenger pigeon is extinct. However, William T. Hornaday, America's foremost naturalist, appears to credit reports of observers who claim to have seen a few specimens. The student is cautioned that this question is not finally settled.

Themes for Compositions or Recitations

Write a composition (or recite) on one of the following topics.

TOPIC No. 1

Carefully re-read pages 7, 8 and 9 of chapter 3. Now describe, in your own words, some of the fanciful and mistaken ideas about wilderness creatures entertained by some men.

1. If men are misinformed, or uninformed, can they wisely decide whether to protect or kill a wilderness creature? Explain what they may do, under misapprehension.

2. In some parts of our own country, and in some other countries, grain fields have been overrun by mice and farmers have suffered much loss thereby. On page 7 you will find a hint to help you explain why this happens. Enlarge on the hint. Describe how mice are checked, in nature. Now, can you think of other destructive creatures, including insects, that are checked by natural enemies? And are such enemies, or "predators," helpful or harmful to men?

3. How are birds especially beneficial to men? How do they help to protect the fields and forests? Describe their beneficial activities as fully as you can.

4. Now use your logic. If mice are checked by natural enemies; if birds protect fields and forests, then what must you look for in other creatures to measure their worth to man? If you discover that a fox occasionally robs a chicken coop, is that enough to condemn him? What else ought you first learn about the fox? If a wolf kills deer, but you learn that he also kills many rabbits and some other creatures, is he a "bad predator" fit only to be killed, or may he be doing good to offset the harm he does? Think about all this and then explain, in your own words, why men must not be too hasty about declaring any creature harmful and fit only for slaughter.

TOPIC No. 2

Carefully re-read the *tabulated* paragraphs on pages 28 and 29 of chapter 3.

1. Now write a 500 to 750 word outline on the development of "creature conservation" in the United States.

2. Explain in your own words—not the words of these essays—how men began to hunt and why; then, when hunting became general slaughter, explain what was done by a few people.

3. Explain how the slaughter was curbed, how wilderness creatures are protected today, and by whom.

Courtesy Canadian National Railroads.

A water source in the Rockies—melting snows and an icy reservoir, high up on the range. This water comes tumbling down the mountain sides but, unless caught by a tangle of tree roots and held in the soil or in pools, in the forests, it will be largely wasted. It will flow swiftly over the land surfaces and into the rivers, to be carried to the sea without doing the country much good. However, if held by a tangle of roots, it gets time to soak deeply into the soil. Then some of it reappears in the form of springs or small brooks, after first having moistened the land; some of it is used by the trees; and much moves through the leaves by the process of transpiration, and rises as vapor, to help form clouds, make rainfall, and rewater the land.

CHAPTER 4

A. Water Conservation

(4) Lakes, Streams and Marshes

WATER CONSERVATION

Water is, of course, the most vital of all natural resources. Without it neither man, the animals, the forests nor anything else could live upon this earth.

Because water falls in the form of rain; because it is everywhere about man, in lakes, pools, streams and in the great seas themselves, man gives it but little attention.

He has accepted it as one of nature's gifts—liberally bestowed, not to be worried about, not needing attentive thought or study.

Yet men, apparently, have helped to destroy some great water sources and with them some areas that once were fruitful and desirable for men.

There is a theory—not offered here as finally accepted or authenticated—that man had a part in forming the Sahara desert. There is some evidence that many men—a considerable population—once dwelt upon the areas that now are sand-blown wastes of this great African expanse. The theory is that these men were reckless of water, as men are everywhere. They harvested one-time Sahara forests without considering the effect upon water sources. They cut down miles of woodlands without consideration for the springs that bubbled from the forest soils, the brooks and streamlets that rippled down forested hillsides, the pools that lay under forest trees.

As they did this these springs and brooks gradually dried up. The sun began to burn, the winds to blow upon, the bared land. The remaining vegetation began to wither and die. At last areas of desolation appeared, with sand gently drifting where trees and other vegetable growths had stood steadfast against them.

Yet men continued to cut down trees until wider and wider areas of desolation formed. The winds fanned, and the sun burned hot upon the land. Gradually the desert spread as its bordering forests were destroyed by men or forced back by drought. And in the end the men themselves retreated before this desert. They were forced to abandon much land because it no longer could yield them sustenance or comfort.

Whatever the truth about the Sahara, this process—removal of trees, then the gradual encroachment of desert-like conditions—can be witnessed in any one of hundreds of small areas in the seriously cut-over and burned districts of the United States. And there is some evidence that the great Gobi desert of China, and some other deserts upon the earth's surface, once were green and fruitful.

An interesting question also is raised by the Great Plains of the United States. Were they, too, formed partially by the acts of men? And were they on the way to becoming deserts?

Nothing about their soil or general conditions suggests that trees might not have thrived upon them as prolifically as upon any area in this well-watered country. Yet the earliest adventurers found them bared of trees. Why?

Was it because great storms and lightning-made fires destroyed them? Or was it possibly because the red men, in possession of this continent before the white men came, had cut, burned or otherwise removed many trees?

In any event, the bisons, or buffaloes, appeared and found these plains to their liking—their lush grasses were more succulent and palatable than the shade-grown grasses of the forests. The bisons took possession—grazed in herds of millions upon these tree-stripped areas and thereby kept new tree-growth trampled down, new seedlings from spring-

ing forth, new forests from getting established upon these broad acres.

Certainly, these Great Plains had the makings of a new desert. With their great areas unshaded by trees, with the sun beating down upon them, with the winds drying their surfaces, their natural water supplies were threatened. Their surface-water bodies, including their rivers, were declining and that meant a decline of evaporation, necessary to regular rainfall.

Possibly white men helped to save the Great Plains from a desert fate. They shamelessly slaughtered the buffaloes—stopped the trampling hooves of 10,000,000 creatures that slowly were beating the plains to dust and opening the way for wastes of sand. Men settled upon the plains, planting orchards, shade trees and windbreaks, thus helping to preserve soil moisture and re-establishing the processes of rainfall. Something of water conservation unconsciously was practiced by men in the areas now known as "the plains states."

Of course, careful study and much sound evidence is needed to establish the exact origin of deserts. A combination of circumstances, with men, animals and nature each playing their parts, undoubtedly is the usual reason for their existence. That, in every case, these circumstances include misuse, abuse or destruction of the water sources is clear. And that desolation follows such water-destruction is no less plain.

The great Gobi desert of China, for instance, has disclosed to scientists that it once was a cradle of human and animal life. It has offered up prehistoric bones and implements, found under its burned sands, and thereby has established that men and animals once lived upon it in numbers.

Even prehistoric men or animals did not choose to live upon fallow places or sterile acres. They settled upon fertile ground—of that modern man may be sure. They as earnestly sought fruitful woodlands, and thereby full stomachs, as modern men seek fruitful acres and good crops today. So places that today are deserts, yet give evidence of having once been largely populated by men, were made into deserts by unusual causes. Since men ever have been reckless of water sources, and even today do many things that destroy them, it fairly may be assumed that men have had large parts in providing the causes that formed the deserts of the earth.

Also, nature normally works in the opposite direction. She gives impulse to her shrubs and trees to crowd, always, upon bare places. She sends rain and forms depressions called lakes, pools or marshes, to hold water. She moistens the land but requires forests and other growths to hold the moisture. She insists upon evaporation, from goodly stores of surface water, to help form clouds and supply repeated rains.

Thus she probably functioned on the areas that today are the world's great deserts—keeping them fruitful and green until men, animals, or a natural catastrophy like a great storm, removed their trees, bared their land, made them open places where surface-water bodies evaporated entirely and rain ceased to be regularly produced.

"Water conservation" is an endeavor to prevent such conditions or correct them where they start. It is an attempt wisely to use, yet to conserve water by keeping it properly stored in lakes, streams or marshes, or in the "forest floor," under trees.

Water conservation sees what occurs wherever men or unusual conditions destroy the earth's cover—the growing

things. It sees that, though water is bountifully supplied, it yet must be thriftily conserved if men would keep the world green and fruitful. It recognizes that men must keep trees and other growths upon the lake shores, stream banks, and around smaller water sources like springs, if they would prevent their decline and the consequent local or widespread drought that follows.

Water conservation has no quarrel with the widest and most profitable use of water. Thus it does not object to its impounding behind dams, so it may create power. It demands, however, that power dams be built with due consideration for the streams and the surrounding land. Their backwaters must not be permitted to destroy more forests, valley beauty and back-country lovliness than is necessary. For this natural beauty also is an important asset and power alone may not always compensate for destroyed beauty.

Water conservation recognizes, in the nation's lakes, pools, rivers, brooks and springs, sources not only of a vital fluid but of charm and solace that man cannot afford to lose.

It demands, therefore, thoughtful preservation of the natural waters. It insists that a wondrous waterfall, an emerald lake, a babbling forest brook, is something more than a utility. While it may be a source of power it also is a lovely and uplifting creation. As such it has as great a claim for consideration as have dynamoes and incandescent lamps.

It sees in a lush marsh something more than a place of malaria and mosquitoes—for it sees there a soil sponge, holding water for the benefit of mankind and animal life, and providing haven for aquatic creatures that are interesting and perhaps as important to the earth's well-being as man himself.

Water conservation, then, is the endeavor wisely to use and reasonably to protect the seas, lakes, streams and

marshes. It not only would retain them undepleted, but undefiled. It sees no reason for polluted lakes or rivers, believing that men readily can dispose of wastes by other means than dumping them into the nearest water.

So it strives to halt misuse or abuse of the waters—recognizing that they are both vital and beautiful and should be cherished by mankind.

Courtesy U. S. Forest Service.
This is erosion on the bluffs, overlooking the Mississippi river. Slowly these are being washed away. Only forests, planted here, can stop this.

LAKES, STREAMS AND MARSHES

The captain of a tug boat, steaming out of New York's harbor, saw in the distance some strange, black specks afloat upon the water.

He drove his tug to the distant specks and found them to be ducks—hundreds and thousands of ducks—as helplessly held, on the open sea, as though they had been caught in traps.

The captain was puzzled. He stopped his boat, went over its side, and scooped up one duck after another. The birds were strangely inert yet strangely difficult to handle. They slipped from the captain's grasp to the deck. Then, as he examined them, he found them to be covered with oil. They were saturated with it. Their feathers oozed it. Their bodies were covered with it.

The captain examined the sea. It, too, was oil-covered. A great, broad band of oil, floating on the water's surface, lay stretched before him for miles.

By cruising about, the captain estimated that this band of oil was five miles wide and twenty-five miles long. It lay there, on the Atlantic's surface, smooth, treacherous and ominous. As wilderness creatures—the ducks and geese, gulls and terns—settled upon it, their feathers became coated with its slime. It greased

their bodies until they could not fly, swim or feed. Pinioned thus, helpless on the bosom of the sea, they could only float about and slowly starve to death.

The oil, of course, was waste from ships, or the oily refuse that men on the shores had poured into the sea.

Oil and water do not mix. Oil just floats, intact and indefinitely. And here, on the broad Atlanitc, so much oil had floated and gathered together as to form a great pool, covering acres on the sea and trapping untold numbers of ducks, geese and other creatures.

The good captain bathed his ducks in gasoline and released them, to fly away joyously and be safe unless, perchance, they should settle again upon the oil band.

Thus not only are birds trapped and starved on the Atlantic coast but the vegetation and the creatures near the shores—including valuable beds of oysters, lobsters, crabs, shrimps and others—slowly are killed by oil that men pour carelessly into the sea itself or into the rivers that flow to the sea.

It is one form of "pollution," this—one manner by which men soil and spoil the waters that lie upon the earth's surface and are vital to the welfare of men.

The forest-covered mountain side, and the no less forest-covered lowland, make this a steadily flowing stream. Water from the hills—melting snows or rains—are caught in the forest, held there, fed slowly into the river. So the stream remains constant, flows continuously, suffering neither from floods nor droughts. But strip the ground bare of trees and immediately the stream changes. It rises in spring as snow-waters rush over the bare land and flood it. And gradually it declines and may dry up. It is the forest cover on the land that regulates and stabilizes the streams of the country, so this forest cover is immensely important and must be preserved. In a navigable stream silt is carried into the waters when the forest cover on the shores is removed. Thus navigation is impaired and top soil—immensely valuable and necessary to the nation—is washed first into the river then is carried out to sea. Forest cover, therefore, is most important on the banks and at the headwaters of every stream.

Indiscriminate Drainage

In inland America—in the state of Wisconsin—lay a great marsh. A hundred pools twinkled from among its reeds and grasses. A hundred little streams meandered about among its rushes and cattails. On its higher ground a few trees grew—willows and others that tolerate "wet feet." And elsewhere, all about its great expanse, were boggy meadows of grasses and flowers.

It was a wondrous marsh and there came to it, in myriads, the migrating aquatic birds—great flocks of mallards, red-heads and pintails; great flights of gulls; great bands of Canada geese.

These birds thrived on its wild rice and the bulbous roots of its water plants. About them moved muskrats, toiling in the shadowy places, building their mound-like homes of reeds and sticks. Among them, sometimes, ranged a sly fox, picking his way around the pools and lightly leaping the brooks. Herons were there, and terns and bitterns. It was a place of swarming wild life—a place of compelling charm and intense interest to many people.

But one day men came and examined the black, rich-looking soil of this marsh. They thought it good; and soon a great dredge appeared that began to eat its way into the marsh.

It cut channels across the broad expanse until it had carved miles of ditches and laterals, transecting the marsh this way and that.

Then its pools flowed away into the ditches. Its brooks disappeared. Its trees wilted and its reeds died. It became an area of dry, black soil.

The men tried to make farms on that soil but failed. It was not so good, for cultivated

Courtesy U. S. Forest Service.
Again, erosion on the Mississippi's bluffs. Deep gullies like this one soon will form everywhere unless forest-protected.

crops, as they had supposed. At last, after many trials with corn, peas, potatoes, and other crops, they gave it up. They abandoned the marsh and left it to its fate.

Its fate, of course, was to be neither field nor marsh, to serve neither men nor the wilder-

ness creatures. It could not even serve the countryside about it any more; for, where once it had sent an invisible stream upward—an unseen column of vapor, rising by evaporation to feed the rain-clouds—it now was too dry. It had nothing to send, to be carried upward by the sun and to fall again, in the form of rain, upon the fields on the higher ground.

That marsh, called "Horicon," and located in central Wisconsin, is to be restored through the efforts of conservationists; however, it illustrates the meaning of "indiscriminate drainage."

Drainage is a process whereby, through pipes, drain tiles, or open ditches, excess water is removed from wet places. Drainage is necessary on some farms. It yields valuable additional agricultural acres in some districts. But drainage, unless done with much understanding, is a destroyer of necessary natural water reservoirs and may do more harm than good.

Much such drainage has been undertaken in the United States. Thousands of acres of good marsh land have been ditched and dried out. Then, found useless for agricultural crops, these acres have been abandoned. But they have been robbed of their natural values. They no longer can offer resting and feeding places for the aquatic birds that travel, during the migrations, from the Gulf of Mexico to Canada—and

that need resting places, liberally scattered about the land, where they may recoup their strength and refresh themselves with food and water, during these flights.

The drained marshes lose other forms of life—the frogs and turtles, the muskrats, water snakes and other creatures. Muskrats are of direct value to men; they yield rich harvests of furs. Others of the creatures are less directly beneficial—their exact place in the scheme of things is not understood in all cases. But it may be assumed that they are necessary to a balanced world life. So the destruction of the marshes is detrimental from this viewpoint.

But more vital: Marshes are "soil sponges." They are areas of saturated ground where tons of water are stored. They give off this water slowly—feeding it into the surrounding soil or sending many barrels of it upward by evaporation. Gathering in the upper air—meeting there vapors from other sources—it forms clouds and these provide rain.

Indiscriminately to drain marshes means to reduce this source of rain, and of soil water for surrounding neighborhoods.

Water conservation attempts to preserve marshes in their natural states, primarily because of their effect on rainfall and soil water, secondarily because they are the resting and

feeding grounds for innumerable wilderness creatures.

Erosion

The banks of the upper Mississippi river are towering bluffs. Slowly, during the ages, the great river has carved a channel that now is a hundred or more feet, in places, below these bluffs.

As the river slowly cut its way into the earth, nature covered the bluffs with trees and other growths. The trees sent roots into the soil, binding it together. The shrubs and lesser growths covered the surface. The whole formed a dense mat of fibrous vegetation that lay like a blanket on the soil, holding it to the bluffs, preventing its parts from slipping or breaking away.

But men found that these trees, forming forests, contained valuable timber. They harvested the timber and did it carelessly. They destroyed young trees, not wanted, but in the way. They trampled upon the shrubs. They bared the bluffs until, in many places, their raw soil was exposed to the sun and winds.

Then, as rains fell, small torrents poured down the bluffs and washed this soil away. Instead of being caught in a tangle of roots, the rains poured over bare ground and into the Mississippi river.

That meant, of course, that tons of silt went into the river too. It was washed down, to fill the channels, obstruct boats, help cause floods—for it spread the river out over its banks, where they were low.

The Mississippi's bluffs are bare, in places, today. That federal agency, the Lake States Forest Experiment station at St. Paul, has been studying them and is convinced that these bare bluffs largely and detrimentally affect navigation in the Mississippi and add to the flood

Courtesy Canadian National Railroads.
A forest pool where beavers have built a home. Here the forest is protecting the waters.

hazard. For, not only do they fill the channels, but they allow the rainfall from the entire reaches of the upper stream to pour unchecked into the valleys. Were they tree-covered again—were men to restore the forest growths they have

destroyed—the lower Mississippi might suffer less damage from floods and less silting of its channels.

This erosion of the bluffs is typical of similar erosions on many stream and lake banks, everywhere in the country. Water conservation endeavors to prevent it. Surface soil is too valuable thus to lose; and waters cannot be kept clear and untainted when surface soils thus are washed into them.

More important: When rainfall thus is allowed to flow unchecked into the rivers it is carried out to sea without properly moistening the land. Instead of being held in a tangle of roots, then to soak slowly and deeply into the soil, it pours swiftly over the surface and is lost before it can penetrate to beneficial depths.

The Water Table

A group of farmers settled in a comparatively forested district in a middle western state. One of their first needs was water for household and farm use. So they dug wells and discovered an ample water supply at a depth of about 25 feet.

They then cleared much land, each farmer pushing back the forests that hemmed him in. Gradually a large aggregate acreage of treeless fields and meadows was formed. Lumbering

operations in the neighborhood added to this deforestation.

At the end of the fifth year the farmers found their wells running dry. They no longer could get adequate supplies of water at depths of 25 feet. They dug deeper—to 35 and 40 feet.

At the end of another five years these deeper wells again were going dry. Again the farmers increased their depths. They repeated this once more, not long ago, this time drilling wells at least 60 feet deep before finding a dependable supply of water.

In about 20 years, as the forests were stripped away, the neighborhood "water table" —the underground water level—had dropped about 35 feet.

Evidently the bared surface soil had caused it. Rainfall, instead of being held by the forest floor, swiftly escaped over the bared earth-top. Instead of seeping slowly into the underground storage places, it ran away over the surface. There was no tangle of tree or other roots—no cover of foliage, with a leaf-mulch underneath—to act first as a blotter, then as a temporary storage reservoir from which the water might seep slowly into the under-soil.

This lowering of the water table is occuring everywhere in the United States. It may portend

a serious water shortage in some places. At least, it should be a significant warning to men. It means that the earth's crust is getting drier. This may have an effect on tree and other vegetable growths.

If it does it will help to establish a vicious circle: Trees, cut down and removed, no longer are present to help hold water; then water, thus not held, fails to penetrate into the soil; then new trees, trying to grow, finding themselves without adequate water supplies, languish or die.

Water conservation seeks to preserve trees for their effect upon water sources. In fact, water conservation and forest conservation are inseparably linked together.

Water and Forests

Water conservation, then, begins its work by urging and striving for the protection of forests, not to provide lumber or even beauty but to protect water sources, store rainfall, and otherwise hold the water supplies.

It is attempting to have trees planted, by government and private individuals, on the banks of the Mississippi, on the shores of lakes, including the Great Lakes, on the creeks or near the springs that are the sources of rivers everywhere in the country. It is teaching that good forest plantations are necessary about the water

supplies of cities, villages, farms and individuals, if these supplies are to be kept constant, clear and pure.

Beyond that, there are other water problems. Pollution is one of them. Even if there is plenty of water, it can be of little benefit to man if it is seriously polluted. If a river is filled with chemicals from industrial plants, sewage from cities and villages, wastes from the farms along its banks, its water becomes hopeless for use by men. It cannot be drunk by them, or even used for less vital purposes.

Yet most of the rivers in the eastern half of the United States, and many in the western half, are seriously polluted. Water conservation is demanding that this pollution be stopped; that industrial plants, cities, villages and farms, provide disposal systems that will cleanse and purify their wastes before they are emptied into any body of water.

This is possible, though costly. It means the erection of expensive bacteriological and chemical plants to receive and treat sewage and other wastes.

For a time, perhaps, men can avoid this expense. They can continue to pollute their rivers and lakes and go to deep wells, distant springs or far-away pools for their drinking water. But if pollution is fair in one place it is fair in another. If men may dump sewage or industrial

waste into one river, then other men, living on other waters, may in turn dump their wastes into these bodies. If they do it—at last polluting even the remotest springs and pools—the immense supplies of pure drinking water needed by humanity no longer will be available. Treatment plants then will be inevitable, regardless of expense.

So water conservation urges their provision now. It holds that there is little excuse, today, for polluting bodies of water anywhere. It contends that it is as barbaric and indefensible to dump waste material into the waters as it would be to dump them onto the highways or city streets.

Next, water conservation concerns itself with drainage. Unless well and carefully done, drainage means water-waste. It means that water artificially is piped or ditched away, exactly contrary to nature's intent. It is sluiced off the land instead of being carefully held upon it. It is turned into the rivers and thus sent to the sea when it ought to be held, as long as possible, upon the land surfaces, thoroughly to soak into the soil and deeply to moisten it.

Water conservation, therefore, opposes drainage unless there is real need for more dry land; unless many additional and valuable agricultural acres are gained by drainage; and unless

these acres are needed. They have not been needed in the United States in the last several years. Agriculture has suffered from overproduction—from too much land in cultivation —rather than from too little.

Incidentally, water conservation recognizes those other values in marshes, and other low and wet places, referred to earlier in this essay. Among them is haven for aquatic birds and other wilderness creatures.

Water conservationists, and creature conservationists, recently induced congress to set

Trumpeter swans, said to be among the last of their kind, find shelter in a forest lake. The forests and their waters are necessary to wild life.

aside a fund to buy such marshes, establishing them in a series, or string, across the country.

Thus the migratory birds will be given refuge, and resting and feeding places, as they move north and south across the country.

Then, too, marshes have a peculiar beauty and particular charm for the naturalist and other outdoorsman. They are rich in animal, bird and insect life and offer much that is interesting.

A further water conservation problem is presented by water power plants. To gain power, men usually must build dams. These dams hold back a stream's water in an artificial reservoir—a broad, artificially made pool—from which it is made to flow through turbines or other machines. It is this flowage, through the right kind of wheels or turbines, that produces power.

These artificial reservoirs, or backwaters, often are permitted to flood much land, kill many trees, ruin much natural beauty. Water conservationists insist that, insofar as possible, this be prevented.

Often, too, power plants take their water supply from behind natural dams. Such dams usually are waterfalls; that is, they are natural walls of rock or earth over whose top the waters pour with beautiful or inspiring effect. Thus Niagara Falls is America's best known waterfall; the Bridal Veil and others in the west are almost as well known.

When power plants are designed to take their water supply from the near vicinity of such falls, or of great rapids or other unusual flows, they usually rob the falls of a part, at least, and sometimes of all of its water. They divert it, through their turbines, and allow it to escape into the lower river through artificial outlets.

Such plants, therefore, mean the ruin of many waterfalls. Water conservation makes some objection to this. It recognizes the need for power. It sees that men must make use of this valuable aid that nature offers them. It realizes, therefore, that many waterfalls and picturesque rapids must be sacrificed. But it insists that, in instances, there is greater merit in the falls and rapids than in the power plants. In districts having adequate power; where new plants mean rather profit for a few men than needed service for the community, water conservation is urged ahead of power. Beautiful waterfalls in such districts probably will add more to the richness of human life than multiplied power plants.

As this is written certain power interests are proposing to build dams on the American-Canadian border. These would flood out great areas of the Superior National forest in the United States, and the Quetico provincial forest in Canada. They would ruin the beauty on hundreds of water courses that wind their way about

in this international playground. They would raise the levels of many lakes, change their shores from natural lovliness to unnatural ruin, and do endless damage to the wilderness.

This damage might be repaired by nature, in time. New shore lines would be formed, new courses taken by some rivers, the new water levels, becoming established, gradually would clear themselves of dead trees, in flooded forests. But the process would take years, perhaps centuries. Water conservation objects to power dams here, under present circumstances. Power is not a sufficiently vital need in the area—or in other parts of the nearby country to which it might be transmitted—to justify this ruin. So water conservation urges the preservation of the natural beauty of the boundary waters and both the American and Canadian governments seem disposed, at present, to take this viewpoint.

However, students should realize that in most instances, where power companies vigorously have demanded the use of waterfalls, rapids, lakes or other water bodies for power purposes, they have gained them. American opinion seems to incline toward the utilitarian rather than the aesthetic or sentimental. Streams are to be "harnessed" rather than preserved in their natural state.

So water conservation usually can hope only to get careful development instead of reck-

less or unduly destructive exploitation. It rather can save *some* water for a picturesque falls than prohibit the power plant. This was done at Niagara—some of the natural beauty has been preserved, but not all of it.

It can insist that trees, killed by backwaters, be removed and the shores of the artificial reservoir be given attentive care. It can require, in instances, that the water passed through a power plant, be restored to the stream in such manner as to retain the greatest possible natural beauty. It can somewhat control, though rarely prevent, the use of any body of water for power purposes.

How the forest holds water—in this case, in the form of snow. In winter it is easy to see how trees act to preserve soil moisture.

Its aim, therefore, must be to induce the most reasonable and least destructive use; to provide such control as is consistent with official and popular sentiment.

Utility and Beauty

Water conservation, then, is an effort to preserve the waters in generous quantities, in lakes, rivers, marshes and the soil.

It would do this by keeping a good forest cover on the shores and banks and by keeping low, wet or marshy places in that condition, because they thus hold tons of water.

Next, water conservation opposes drainage, except where really necessary to the welfare of agriculture, because pipes, drains or ditches usually sluice water off the land where, instead, it should be held.

Third, water conservation seeks to keep the waters pure and undefiled. It attempts to stop such pollution as is caused by pouring waste oil into the seas, lakes and rivers. For instance, it recently arranged a world-conference on this subject—the purpose being to get an international agreement whereunder the shipping of all nations will be restrained from pouring dangerous quantities of oily or other wastes into the seas.

It also is attempting, by laws and an awakening of public sentiment, to stop the dumpage of sewage or other municipal or industrial wastes into the streams or lakes. It is demanding sewage disposal plants that will purify these wastes before they are released into the

waters. Such plants, it insists, must be provided by industry as well as by cities, villages and farms.

Finally, it is asking the protection of lakes and streams because they are wondrous assets, quite aside from their importance as sources of water necessary to life.

For they are beautiful. No other natural creation excels them in this respect. An expanse of blue water; storm clouds gathering over a great lake; a sunrise through the haze of a far horizon, or a sunset dying the waters red; the moon, laying a shimmering path of gold upon a pool; a stream under the arched branches of trees; a forest brook, rippling over stones and winding among the mosses—these offer something that cannot be measured in dollars or by any standard of practical values.

Yet it is something so real that men cannot hope to destroy it and yet remain men. For, without a resolute willingness to preserve such beauty, even at some cost of profits and material comforts, men cannot remain thoughtful, considerate, co-operative and compassionate.

If men as a whole become so hardened as recklessly to destroy their sources of solace and refinement, they will have become dangerously cold and grasping. They will be destructive of each other and destructive of the civilization they have evolved.

QUESTIONS

1. What is "water conservation?"

2. What causes deserts?

3. In what way do men help to create deserts?

4. Why is it clear that the great Gobi desert of China was not always a dry and sun-scorched area?

5. Describe one form of water pollution and its cause.

6. What is drainage? When is it beneficial and justifiable, when unjustifiable?

7. In what way are marshes "soil sponges?" What becomes of the water in these "sponges?"

8. What is "erosion," and how does it affect the surface soil?

9. What is "the water table" and why is it lowered? What affect has this on farm wells?

10. How do forests prevent erosion and how do they preserve or hold water?

Themes for Compositions or Recitations

Write a composition (or recite) on one of the following topics.

TOPIC No. 1

Carefully re-read pages 6, 7, 8 and 9 of chapter 4.

1. Now, in imagination, transport yourself to the Sahara desert in Africa, or to the great Gobi desert in China, and picture these areas *as they probably were in primordial times.* Describe them.

2. Now describe how primitive men probably came to these areas—why they selected them, then what they did. Remember they were primitive men. They did not set up saw mills; neither did they have modern axes. However, you may assume that they had cruder tools and that they knew how to kindle a fire.

3. Do not forget that the forces of nature sometimes supplement the destructive works of men. How, therefore, were the Sahara and Gobi deserts probably formed?

4. Now explain how deforestation affects land areas in the United States—what effect it has on their water supplies, what erosion and fire may do, and to what condition such areas may, at last, be reduced. How can such a condition be avoided?

TOPIC No. 2

Carefully re-read the two paragraphs under the caption, "Water and Forests," on pages 23 and 24 of chapter 4.

1. Then carefully study the pictures in chapter 4, reading all of the explanatory matter under them.

2. Now write from 500 to 750 words describing how forests preserve water supplies. Begin with the rain; it falls upon a forest. Where do the raindrops go? What are springs? How does the forest "steady" the rivers? What about snow? And does erosion occur in forests?

Nature's own trail, unspoiled by man. How easily, then, man-made highways could be made beautiful instead of ugly! How readily birches like these, or other trees, might give them a charm that now, too often, they utterly lack. "Scenery conservation," is an effort to preserve scenes like these. It does not demand that *everything* be preserved—that no forest, river, wild meadow or wooded glen be used because, perchance, its beauty thereby might be impaired. It only asks that there be no reasonless destruction and that careless acts of despoilation be stopped.

CHAPTER 5

A. Scenery Conservation

(5) Present Natural Resources

SCENERY CONSERVATION

One of America's resources has suffered beyond others. It is the country's scenery.

The beauty of the land, as white men found it when first they approached American shores, has been sadly impaired.

Fine scenery has been effaced in places; it has been reduced almost everywhere; it has suffered even in the remotest corners of the United States and few young Americans ever have seen any considerable fraction of their country as lovely as it was when white men first reached its shores.

Great forests have been felled, then burned, then left as charred ghosts of their former grandeur.

Great waterfalls have been harnessed, then robbed of their flow, then left as gaunt rocks in the stream beds.

Broad rivers have been defiled until their blue waters have turned to brown, their green banks to ugly black.

The environs of cities have been stripped of trees. The country, where nature has endeavored to provide a new kind of beauty to replace the forests and plains, has been hidden behind billboards and roadside shacks. These line the highways in many states, blotting out the fields and remaining woodlands.

All this does not mean that there is no lovliness left in the land. There is much of it, of course. Nature has been very kind. She has set forth new beauty to replace much of the old. But man is surging around it, threatening its existence. About it, too, are broad bands of desolation.

Yet scenery, which means the surroundings amid which men live, as surely influences human progress as do the material resources.

Put any group of children into an ugly environment—keep them surrounded by blackened walls, dirty pavements, ugly shacks, smoking chimneys; or keep them on a backwoods waste that is barren, burned and desolated, and note the effect on their lives. A few may rise above their surroundings; the bulk will be as impoverished and barren of ambitions, good impulses or uplifting ideas as the blank walls or barren fields themselves.

Put a people—a nation—into a desolated land and they, like children, will decline to its level.

America's people have been buoyed, inspired and animated by their wondrous scenery—the noble environment provided by their country. They have achieved because they thus were inspired. Yet they have demolished the very sources of their inspiration.

"Scenery conservation" is an effort reasonably to conserve the magnificent natural environment of America's people.

Its purposes are as sane as are those of other informed conservation. It realizes that America cannot remain a wilderness land, encompassed by wilderness beauty. It understands that civilized man is not primitive man, content with boundless forests, rushing waterfalls, pristine streams, windswept plains or surging seas.

It makes no ridiculous claim that all must be preserved—that no forest, river, wild meadow or wooded glen must be used because, perchance, its beauty thereby might be impaired.

It clearly sees that men not only must utilize, but may need to destroy, many places of great natural beauty. It

recognizes the claims of industry and commerce. It would not abolish power plants because many of them despoil waterfalls or rapids. It would not stop shipping, though many ships soil the rivers they traverse. It would not halt the growth of cities, factories or farms because they use land, erect structures, fell trees, dig ditches, string wires or create polluting wastes.

But, like other conservation, it demands restraints. It contends that factories need not wantonly or carelessly ruin much surrounding country; that shipping need not pollute the waters; that cities, villages or farms need not despoil their neighborhoods.

Scenery conservation recognizes that most of the destruction of scenic hills, valleys, waters or forests is committed by carelessness or avarice, not necessity.

It is not because men *cannot* preserve a fine environment that they destroy it, but because they are unwilling to give time, energy or money to its preservation.

It is not because they *cannot* profitably operate factories, truck lines, steamships or cities without desolating their surroundings, but because they do not choose to make the sacrifice.

Practically all men favor scenery conservation though some may favor it only for themselves. For instance, a hardened exploiter may acquire a country place. Immediately he will take steps to preserve its surroundings. And, should others attempt to destroy his trees, set poles carelessly upon his estate, or erect billboards across his lawns, he would resist indeed. He recognizes the value of scenery, or beauty. Most men do. They want pleasant environment—trees, flowers, good vistas. These are "scenery."

Scenery conservation asks them to preserve natural scenery for the entire nation. It wants some forests pre-

served solely because they add beauty to the countryside; some lakes and rivers protected solely to preserve their natural charm; some natural vistas perpetuated for no better reason than that thousands can gain inspiration from them.

It demands roadside trees because bare roads are ugly and unnecessary. It asks men not deliberately to spoil a wondrous view by erecting a billboard across it; a green hillside by building a shack in its middle; a fine stream or pool by dumping sewage into it or devegetating its shores.

Scenery conservation is introduced here because scenery is among the "present natural resources." It perhaps needs attention ahead of other resources—not only because it is faring badly, but because the others will compel attention in any event.

If the United States begins to experience a timber famine men will rally around its forests whether they now are interested or not. If cities, counties or states begin to suffer water shortages, they will try to restore their water sources, whether they today are disturbed or not. If wilderness creatures disappear until men no longer can hunt or fish, or no longer can satisfy their demand for furs, they will attempt to restore some of the natural creatures.

But, though the influence of scenery, or natural environment, is vital, it is not immediately tangible. It is not consciously felt. It is not recognized, measured and evaluated. Only a thoughtful few realize how such an incident as scenery may affect a nation.

So scenery needs attention. Any extensive trip over the United States will disclose more desolation—more woodlands burned, waters defiled and areas of waste and ugliness; more roadsides cluttered with billboards and shacks; more slag piles, refuse heaps, smoking chimneys and other perhaps necessary accessories of industry, than lovliness and unspoiled beauty.

The "beauty spots" already are isolated. They specifically are noted and labeled. Such a condition is foreign to America. Beauty spots once were everywhere. Beauty was the usual condition, not the unusual. It was devastation, ruin or desolation that was rare.

Therefore scenery conservation is considered in this essay. Students should realize that it is easy to become sentimental about natural beauty, and then unreasonable about its preservation.

Man must strive. His industries must exist. His destiny is to dig, cut, mold, carve, fabricate and construct. He cannot tolerate any unreasonable restraints in behalf of scenery. Scenery conservation ever must beware of impractical programs or proposals. But man's tendency needlessly to destroy and desolate is reasonless. Scenery conservation properly may go before legislatures or congress and demand laws to stop it. A fair part of the land reasonably may be held, unspoiled, for the enjoyment of the people. And though industrial man is vitaly important, he yet may not use his industry as excuse for stripping America bare of loveliness.

A man-made highway. Not a bit of beauty about it except the tree in the background.

PRESENT NATURAL RESOURCES

America today still has a share of all of the resources found in the country by the first white men.

There still are great bodies of water. They still contain an adequate supply of the fluid necessary to life. They still manage to keep most of America's soils moist, and America's people supplied with drinking water.

However, some lakes have declined; many pools have dried up; thousands of acres of marshes have been drained; innumerable brooks, that once helped to water the land, are gone; and many rivers have been so polluted that their waters no longer can serve for human uses.

In August, 1930, American farm leaders urged President Hoover to prevent "a major catastrophy." They referred to the effects of a drought. Most of the farms of the United States were so dry that crops were threatened. Many cities were reaching the end of their water supplies. Orders were issued to citizens to stop lawn sprinkling, automobile washing, laundry work and every other form of water consumption not vitally necessary.

"The war department undertook to help distribute water in sections of Indiana and Kentucky," according to a dispatch from Washing-

ton. Other extreme measures were taken, especially in the middle west, to provide water for livestock and general farm needs.

All this in the United States, once so copiously watered that every woodland was moist and every pool brim full!

This temporary condition, certainly, demonstrated nothing conclusive. The country yet has its major water bodies; these still offer up enough evaporation usually to insure rain; the nation does not frequently, or with any regularity, suffer water deficiency.

But any drought should arouse thought. After all, millions of acres of trees have been destroyed. Trees send tons of water to the clouds by "transpiration"—an upward movement of water-vapor, through the leaves. When endless square miles are bared of trees the effect on rainfall may be material. It may be that deforestation now is beginning to reduce the country's precipitation.

Then, too, small lakes are reduced and some streams, full-flowing 50 years ago, are low today. Some men in every place know of brooks that flowed on the playgrounds of their youth but now have disappeared. And of small forest pools, too many are gone to be counted. Their evaporation has been lost, along with transpiration through countless millions of leaves.

Three states—New York, New Jersey and Pennsylvania—are contending for the waters of the Delaware river. The cities of New York, Philadelphia and Trenton are dependent upon them, yet have no assurance that they will continue to constitute an adequate supply.

Several states have contended for the waters of the Colorado river. The city of Los Angeles has piped to the distant hills—with men at intervening places occasionally attempting to rob the reservoirs—to get precious water for human needs.

Meanwhile even the Great Lakes show a slow decline. They fluctuate widely, of course, rising and falling each year; but the general curve is downward. All of these lakes, except Superior, disclose this condition on the United States Lake Survey charts covering the period since 1860. As for Lake Superior: Its outlet is dammed. Its basin artificially is kept at a fixed level. How long this can be done depends on how much water flows into the basin from the surrounding country, or falls as rain.

Since nature works very slowly, any appreciable decline in the major water supplies of the United States, in such a comparatively short period as 50 or even 100 years, is arresting. It means that nature has been dangerously accelerated; it may mean swifter water declines in the future.

Water then, though still generously available, is among the "present natural resources" that are losing ground. America is drying up—very slowly, to be sure; not alarmingly yet; but sufficiently so Americans must take steps to protect and preserve their water sources.

The Present Forests

The United States still has some forests—no longer the great expanses that once covered nearly one-half the land area, but enough yet to serve most needs. But millions of acres have been

Billboards, blotting out the view, occupying space that ought to be planted to trees.

stripped of forest growth. The effect upon water sources, climate, agricultural conditions and general human welfare is material, in many

places. Large parts of several states are barren. They lie fallow, today, producing nothing. There is menace to prosperity in such conditions.

Where the United States once had about 850,000,000 acres of virgin forests, only a little more than 100,000,000 acres remain. About six-sevenths of this acreage has been cut. However, some new forests since have grown. Perhaps another 100,000,000 acres now can be classified as forested land. But lumbering continues and both the old, and some of these new, forests are being harvested. So the exact balance is not determinable.

That the United States is using timber, or wood in some form, about four times faster than wood is growing, is agreed to by foresters.

Whereas the country once had "inexhaustible" forests and a limited population, it today has 123,000,000 of population and the "inexhaustible" forests are about gone. Yet it requires a hundred times more wood than in pioneer days.

Its railroads are using about 125,000,000 ties every year and are cutting 25,000,000 trees to get them. Its mines are using 200,000,000 cubic feet of lumber in props, timbers and side walls and its fruit growers are building 20,000,000 shipping boxes annually. More than 250,000,000 cubic feet of lumber still go into barrels and kegs in a year, and there are 2,500 newspapers and 15,000 magazines, consuming

more than 2,000,000 tons of paper every year. That means 4,500,000 cords of wood, and perhaps nearly that many small trees, ground into pulp for them annually.

Endless statistics—more confusing than enlightening—can be found, yet all point to a few simple conclusions: The United States is using up its remaining forests about four times as fast as it is growing new ones, it already has used six-sevenths of the virgin timber, and, theoretically, it is within 30 or 40 years of a timber famine.

However, a timber famine is not safe to predict. To produce timber, or wood, men yet may do new things with trees. Lumbermen hesitate about planting and caring for them because it takes from 50 to 100 years to produce a mature, or "merchantable" tree. But present ideas about merchantability, or usability, may change.

Perhaps trees need not be large before being put to use. Perhaps small trees will do. Possibly even mere saplings, five or ten years old, yet may serve to produce "lumber."

For "lumber" may, in time, mean manufactured boards, made of pressed cellulose—especially the fibres of trees. It may be that men will find that they can grind up almost any kind of tree-growth—little saplings, branches,

twigs, even bark and leaves—and, by proper chemical and other treatment, reduce them to pulp, then press them into strong, durable and satisfactory boards.

If so, the entire forest aspect will change. For, if men find that they can grow usable trees in a few years instead of waiting a hundred, they won't wait. They won't grow real forests. They will grow fields of small trees, cut them with a machine like a corn binder, grind them up, mold their pulp into lumber, and go on with their building and other construction as they have before.

Students of conservation, and especially of forest conservation, must consider this possibility. It changes the future outlook and work of the forester. Instead of planning forests on a long-time basis, he then would plan for quick results. Instead of concerning himself with a distant future, and operating accordingly, he would concern himself with seedlings, transplants and early harvests. And, for a time at least, he might find that the great acreages of brush—the saplings of pine, oak, aspen, wild cherry and other lesser woods that have sprung up in the country—might be sufficient to supply the lumbermen with all the raw materials they needed.

There is some tendency in this direction. Practical users of wood are searching for quick

growing trees or processes whereby they can use small and inferior trees. They are less interested in establishing natural forests, to be left uncut for years, and to be harvested only when the present generation is dead and gone.

This is a significant trend and must be watched by every student of conservation. But the student must not forget that it affects only forests, or trees *that are to be used for timber.*

It has nothing to do with forests intended to protect the headwaters of streams; forests needed for the general welfare of the land; for-

An ugly corner in a city. "Scenery conservation" would have beauty here instead of this ugliness.

ests perpetuated to insure rainfall, prevent erosion, give shelter to wilderness creatures, or

forests to serve recreational purposes or perpetuate scenery.

Real forests—fine, mature trees, slowly grown by nature's processes—will remain as necessary to the country as ever, even though not a stick of future timber is cut from them. Forest conservation will remain a vital science.

The Wilderness Creatures

America's wilderness creatures are, of course in equal decline with the forests and waters. Civilization naturally crowds them out. They have been pushed back upon narrowing frontiers. Even there they are further destroyed by enemies, including hunters and fishermen. Also, such wilderness creatures as are damaging to men are being exterminated by government, for the sake of domestic stock, agricultural crops or human comfort. Thus the federal biological survey reports that in Utah alone, two of its hunters put out many thousand poison baits to kill predatory creatures—especially coyotes, mountain lions and bobcats.

Any such wholesale poisoning must, of course, not only annihilate these animals, in time, but with them hundreds of lesser creatures that take the bait.

Some of this destruction may be necessary, some of it undoubtedly is ill-advised. In any

event, it reduces the number of wilderness creatures and these face extinction except for a few species that men may elect to preserve—and, oddly enough, a few that men most earnestly wish to be rid of, like rats, mice and others.

However, some selection and preservation already is going on. For instance, a new fur industry has come into being. It produces fur bearers on "farms" instead of trapping them in the wilderness. It probably insures the continued existence of the fox, mink, raccoon, beaver, muskrat and some other species—not as free, wilderness creatures, to be sure, but as semi-domesticated live stock.

Some birds, including song birds, also may persist, for two reasons: They are adapting themselves to man-made conditions. Thus the robin today lives contentedly in cities whereas naturally he is a wild bird. The woodpecker, flicker, grackle, starling, martin, wren—and, to somewhat lesser extent, the goldfinch, oriole, meadowlark, bluebird and the swallows—seem to have learned how to take up residences and find livings even in men's cities, certainly in suburbs and on farms.

The second factor in favor of these birds is a widespread public sentiment. The song birds have won more friends than other creatures—obviously because they are neither de-

structive nor annoying, and because they give color, song and movement to their surroundings.

So song birds may persist, despite some destruction that goes on among them. Some species legally may be hunted in some states. Cats kill enormous numbers—the 70,000 cats in Massachusetts kill at least 700,000 birds every year, says E. H. Forbush, ornithologist for that state, after long and careful observation. Some birds are killed by boys with slingshots or air rifles, their nests are robbed, their young destroyed. However, public sentiment is with the birds and they may be counted among the present natural resources that are likely to prevail.

Fish, too, may endure, because men now are artificially developing them from spawn, placed in hatcheries. These are operated by state and federal agencies and some by private groups. Thereby many million "fry" or "fingerlings"—which means very small, or "finger sized" fish—are released into the lakes and streams each year. Of course, fishing both for sport and commerce is increasing but the fish supply probably can be sustained except for one thing: Pollution of the waters, if it continues, may make many more streams untenable by fish. Thus the Illinois river, from the city of Chicago, for many miles down its course, no longer sustains fish life. It has become so polluted by sewage that its oxygen

is consumed and fish cannot live. Innumerable other rivers are in similar condition.

Except for this threat of pollution, fish life probably can be sustained in American waters, since hatcheries and rearing ponds can be multiplied and since fish cultural departments have been set up by both federal and state governments.

As a whole, then, wilderness creatures are declining and the present supply cannot be compared with the abundance that America once knew. The best efforts of conservation are needed to insure future wilderness life.

Present Scenery

As for scenery—its decline has been noted in the opening chapter of this essay. American scenery has been shamelessly abused. In a sense it is not possible to "destroy" scenery. Though a mountain be blown to bits, a "scene" remains. Though a forest be cut, new growth springs up in its place; a new "scene" is created. It is not like the old scene, may not be as appealing or beautiful, but nature, left to her own devices, always covers bare places and promptly begins to establish new beauty.

It takes persistency by men to keep a country like the United States ugly. They must again and again attack beauty. Yet in places they

manage to do it. There not only are ugly spots, but large areas of ugliness in the country.

That is because men persistently destroy beauty. For instance, the gashes men cut into the countryside and call roads, soon would be covered by greenery and restored to beauty; but men not only want their pavements clean of vegetation, but extend the demand to the roadsides. Repeatedly they cut down natural growths, lop off trees and, in spring and fall, turn loose that deadliest destroyer, fire, to sweep across the beds of goldenrod, blue flag, buttercup and violet.

Thus by persisting men can keep roadsides ugly. By persistently digging, dumping, or releasing gas fumes, they can keep a large countryside ugly. By building obtrusively or setting enough shacks and billboards upon the landscape they can despoil a whole county. And by persistently pouring chemicals into the waters and repeatedly burning great areas in forest fires, they can reduce whole states to ugliness.

They have done and are doing these things and an honest inventory of scenery, among present natural resources, cannot fail to take note of them.

However, men also have attempted to restore natural beauty in places. They have permitted nature to make restoration in others.

Thus they have kept intact some of the great national and state parks. Thus every large city now has its forester, park board, planning engineer and landscape artist. All of the larger cities are laying out parks and drives, planting trees, and growing shrubbery and flowers. In fact, in large cities, where planning commissions and landscape engineers are functioning, the problem of scenery conservation is on the way to solution. To beautify or create scenery has become a fixed policy. That step having been taken, it remains for conservationists only to encourage finer and larger conceptions of beauty so more ambitious programs will be undertaken.

And here—ugliness in the woodlands. These shacks, and forest slash, have ruined surrounding scenery.

Meanwhile other definite trends have developed. There is increasing interest in home

beautification—in gardening and landscaping by individuals. More important: a considerable public sentiment has developed against further relentless despoilation of scenery. It especially is fostered by America's women. Among its outstanding supporters is the General Federation of Women's clubs. This federation, aided by such organizations as the American Legion and many others, is making a determined effort to protect and restore natural scenery, beautify the roadsides, confine billboards to "commercial districts," enlarge parks and beauty spots, and spread the teachings of conservation to all Americans.

So there is hope for scenery despite a surging commerce, a conquering industry, and a restless people that tread carelessly upon their natural creations.

Commerce and industry are vital. They must not be unduly curbed. They provide necessities and comforts — houses, theaters, radios, motor cars, airplanes, telephones, garden tools or reading lamps—by which men get about, broaden their horizons, increase their activities, enlarge their experiences and enrich their lives.

From the human viewpoint, no wilderness richness can substitute for the fruits of industry and commerce. But needless destruction is not a part of their necessary activity, nor are greedy

seizures, wanton wastes or heedless despoilations of the natural resources. These conservation fairly can seek to stop.

Necessary Remedies

With reference to present natural resources conservation has the following program or policy:

Pollution of the seas must be stopped. Conservation proposes to stop it by international agreement regulating the dumpage of oil and other wastes from ships or shores. Sea-pollution is a world-wide problem.

Ugliness even in the remote forests. Slash, a terrible fire hazard, as left by lumbermen.

More laws and good enforcement also are needed against pollution in the seaside states. They must stop defilement of the waters or lose

their fisheries—especially the crab, lobster, oyster and similar shore fisheries.

A strengthening of laws in inland states must follow, to protect lakes and streams from needless pollution. These laws must require treatment systems by cities, villages, towns and industries, and better sanitation on farms. Unless the states prohibit needless pollution they endanger their sources of drinking water as well as their natural bathing and play places, and much of their beauty.

Conservation also seeks to protect the water sources because the United States evidently is beginning to experience a water decline. It urges tree planting about the headwaters of streams, around lakes, and on river banks. Much of this planting is "a state job;" some of it may be a federal function.

The federal government has jurisdiction over navigable lakes and streams. It should, therefore, assure them sufficient water. Forests are needed on the shores of the Great Lakes, along the Mississippi river, on the banks of other navigable streams. Their waters, else, surely will continue to decline.

But army engineers, in charge of these lakes and streams, have given little attention to forests; in fact, discount their influence. They prefer to rely on engineering works—dams, reser-

voirs, levees and compensating works—to control water. By holding back, or gathering in storage pools, some of the waters now wasted, they hope to perpetuate the supply.

Conservation contends that this is a mere, secondary expedient. First there must be real conservation—forests holding water in the soil; forests helping rainfall; forests halting erosion and floods; forests shielding the lakes and streams from drying winds with their branches, and serving them with their entangled roots.

Conservation insists that no mere engineering works will insure unimpaired water supplies for the people of the United States. To rely on them is to put faith in a false structure. Engineering works will help but the important protective medium is the forest.

Next, conservation would have the states strengthen their laws against drainage, so marshes may be saved. And it would have the federal government promptly carry out the program, now authorized by congress, to buy and preserve a series of marshes from the Gulf of Mexico to the Canadian border, for the sake of the water supplies they will hold and the refuge they will give to aquatic birds and other creatures.

In the matter of present forests, of course, conservation advocates planting, selective cutting and reasonable restraints against needless exploitation.

It also wants a "slash disposal law." Slash is waste—tree tops, branches, bark and trimmings from trees—left by the lumbermen. This slash now is scattered about the forests where it dries, becomes tinder-like, then bursts into flame if sparks get into it.

Conservation wants uniform laws in all forest states—or a federal law—to require that this slash be gathered and disposed of. For fires are among the most destructive of forest enemies. Conservation is trying to prevent and check them. It asks the states to appoint wardens, supply good fire fighting equipment, and see that these "fire departments" are as well-manned, equipped and responsive as any city department.

Conservation also wants enlarged and more numerous federal and state forests—all the forests that congress or the state legislatures can afford to buy for the people. Meanwhile it is encouraging school, town and county forests, and the development of farm woodlots. It is meeting with much success in these fields.

As for wilderness creatures: Conservation advocates protection—again largely through laws—so that the wild things may not be exterminated. It urges enlarged and more numerous refuges and more game wardens to extend protecting hands over the wild things.

In the matter of scenery it again turns to laws: Laws setting aside great areas of natural

The contrast: A highway, as it passes through a midwestern city, trees planted close along its length, grateful shade comforting the traveler, beauty evident to the most casual passerby. This is "scenery conservation"; this is the sort of thing that this conservation seeks in many places, everywhere in the land. It urges that men give thought to preservation and restoration as well as to their material needs. It has a sane program, not intended to stop progress or hurt industry, but to keep for Americans some of the natural loveliness of their country.

beauty like the federal and state parks; laws protecting scenery against vandalism; laws against unwise exploitation.

It recently has given much attention to roadside beautification—largely fostered by America's women—and many states are beginning to understand that highways can as readily be made beautiful as ugly.

It also would regulate billboards and, to some extent, other structures on or near highways. Here it argues that men in cities cannot build where and as they wish. Zoning laws set aside certain restricted districts. A factory, for instance, cannot arbitrarily be set down amid many fine homes. Billboards and other structures should be equally controlled in the country. Certain areas in the country are as surely "residential" as many sections in cities. So conservation contends that the states should enact "state zoning laws," and thereby confine billboards and some types of buildings to industrial or commercial zones.

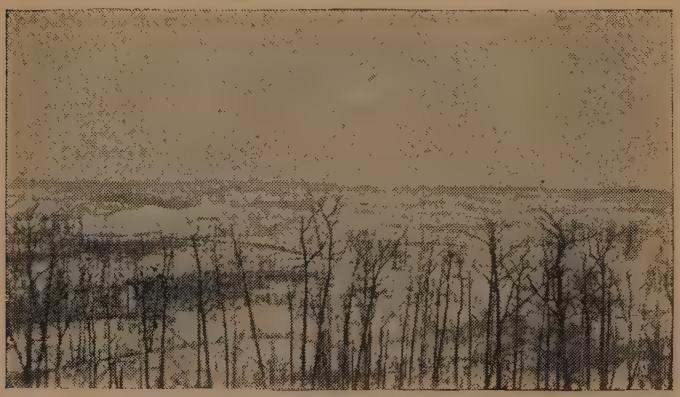
Conservation takes no unreasonable position against all billboards. It recognizes their possible place in commerce and therefore does not demand their abolishment; but it insists that they be not obtrusively placed amid fine scenery.

It will be noted that conservation seeks its remedies largely through laws. That is because

the agencies of government alone are authorized and qualified to carry out many of the precepts of conservation.

Behind conservation laws there must be popular opinion and sympathetic public support. Without them conservation laws are nearly worthless; they could not reach deep into the forests and restrain the poacher, the killer or the vandal.

So conservation clearly understands that it must appeal first to the people; must win general public approval for its program. Much of its work has been, and still is, educational. But, having gained popular support, conservation must use laws, and agents to enforce them, so that a destructive minority may not flaunt public opinion and do irreparable damage to the people's natural resources.



QUESTIONS

1. What is "scenery conservation?"
2. Has America's scenery suffered since white men came to the continent? In what way?
3. Does scenery affect human character? If so, in what way?
4. Does the sensible "scenery conservationist" demand the protection or preservation of all beautiful places?
5. For what reasons are beautiful scenes sometimes justifiably destroyed?
6. Is water, as a "present natural resource," as abundant as it was in early America? Describe present water conditions.
7. About how much faster is the United States using its forests than it is growing new forests? Theoretically, what does this mean?
8. What possible substitute for mature or "merchantable" timber may perhaps be developed?
9. Are wilderness creatures holding their own? If not, why not?
10. What modern forces are at work that may perpetuate some species of wilderness creatures? What species are they?

Themes for Compositions or Recitations

Write a composition (or recite) on one of the following topics.

TOPIC No. 1

Carefully re-read the first four paragraphs on page 7 of chapter 5.

1. Now explain, in your own words, what ugly surroundings or environment are likely to do to individuals, whole communities, or even to a nation. Use your own imagination and logic: How would you probably react if continually shut up in an ugly hole or dungeon, or if perpetually in dirty and mean surroundings? Would you be gay, bright, cheerful and ambitious?

2. Explain, then, how scenery, or environment, may affect a people—a whole nation—and what kind of scenery is required to inspire the nation to its finest accomplishments.

3. Then explain by what sensible steps scenery can be preserved and where human environment, in the United States, can be improved.

4. Now read the last paragraph on page 7 and the first on page 8, chapter 5; then explain how

scenery can be preserved and protected without hampering commerce and industry.

TOPIC No. 2

Carefully re-read all of chapter 5, from page 26 to its conclusion.

1. Now write a 500 to 750 word outline, explaining the remedies that conservationists would apply, to check the destruction of present natural resources.

2. After making this outline, explain the relationship between the natural resources herein discussed. Do forests affect the waters and do the waters in turn affect the forests? Are wilderness creatures dependent on forests and waters and are they, perhaps, necessary to the forests? Does scenery depend on waters and forests? If there are close relationships, can you conclude that a sound conservation program is simply "wise use and reasonable protection of the whole out-of-doors?"

Practical Conservation—A feeding shelf that successfully attracted many kinds of birds. They came in a steady procession, summer and winter, for the diet of cracked corn, nut meats and suet—especially suet—here provided. This shelf also attracted squirrels. These were interesting, and did not interfere greatly with the birds, but ultimately became a nuisance because of their number. If squirrels are not wanted such a shelf as this must be set on a metal pole and removed from the vicinity of trees, from which squirrels will jump. Or a hanging shelf, suspended on a wire, must be provided.

CHAPTER 6

A. Practical Conservation

(6) The Declining Forests

PRACTICAL CONSERVATION

Conservation can be practiced by anyone.

To plant a tree, care for a garden or feed the birds is practical conservation. In fact, some of the best efforts in behalf of the nation's resources are these simple, practical undertakings by individuals.

Perhaps a hint, here, on how to go about some of this practical conservation will not be amiss.

One of the most popular of such endeavors is bird protection and feeding. Birds can be attracted to the vicinity of any home. Certainly, in the congested sections of large cities only sparrows may be attracted. In less congestion a few robins and grackles may join them. In suburbs a large variety of birds is likely to come to any good food supply. And in the country practically any and all of the species native to the district—or migrating through it—will gather around under proper invitation.

To attract birds a good feeding shelf first is desirable. Any platform, roofed over to protect the food from rain and open on three, or all four, sides to give free access, will serve.

Such a shelf can be erected against the side of the house, near the windows; or it can be set in an open place on the lawn; or it can be fixed to a tree or hung from a wire.

The shelf proper should be covered with burlap or other rough material to prevent seeds from blowing away. It should have raised edges, for the same reason. It should be built around a center pole, rather than on corner posts, because thus free entry from all sides is assured; the birds are less likely to suspect it as a trap. On this center pole containers for suet can be hung.

A few details are to be remembered: A shelf set on the ground, unless on a metal, or metal-covered pole, will attract squirrels and other creatures as well as birds. The squirrels and birds will, to some extent, feed together; but the squirrels, while on the shelves, will keep away the birds.

Squirrels, of course, also are interesting and if it is desired to attract them, as well as birds, a shelf on open ground, mounted on a wooden pole, will be very satisfactory. If not, a metal pole must be used or other guards provided around the shelf.

It is surprising how cleverly squirrels will reach even a protected shelf. They will swing down upon it from near-by branches or will make long leaps to get to it. So, if they are to be excluded, it is best to hang the bird feeding shelf on a wire, far enough away from any tree to insure its safety. Then birds can feed undisturbed.

Such a shelf, of course, must be hung on wheels, so it can be pulled to a window for its supply of seeds, then can be drawn out on the wire again.

The best feed for birds is cracked corn, millet, nut meats, any small seeds, and suet—especially suet. The suet can be supplied in large slices, placed in a wire hopper; or can be wired to the center post of the feeding shelf, or to trees. But it by far is best to chop it up in a meat grinder and serve it, thus hashed, along with the corn and nut meats.

Sunflower seeds are recommended and are relished by birds, but their husks are left scattered about the shelf and if this is objectionable they had best be omitted from the menu.

A feeding shelf, properly made and stocked, will be an endless source of pleasure to anyone interested in birds—and to many whose interest is not now keen but will develop, after watching the procession that comes to the shelf.

Blue jays will fly to it with that remarkable grace that is characteristic of this bird; red-headed woodpeckers will come and are likely to be the "boss of the place" after a few visits. They will scold and threaten other birds and will drive off blue jays and grackles as readily as the smaller fry.

Nuthatches delight in a diet of suet and appear to carry it to their nestlings. Brown creepers will flit about on the center post if suet is there. The native sparrows will feed on or about the shelf although for some of these a scattering of seeds on the ground is more attractive. English sparrows, of course, will be attracted and may become a nuisance. The thrushes, including the robins, the towhees, chickadees and many others, will appear even in suburban gardens; and in the country a constant procession almost can be promised to any consistent bird feeder.

The shelf, of course, must be kept supplied constantly, else the birds soon lose faith in it and visit it only occasionally.

As anyone can feed birds so anyone can plant trees.

That may sound absurd to those who live in apartment houses or on small lots that even one tree would crowd. But trees, at first, can be grown in two-inch flower pots. For some years they are small enough to thrive in a window box.

For most trees are grown from seeds. Some kinds of seeds can be gotten almost anywhere—off the streets, from vacant lots, from the sidewalks, even, as they are blown about by the winds in late spring or during the summer. Wherever there are a few, sturdy trees there are likely to be seeds.

Almost everyone has seen the seed pods of the maples—brownish, winged structures that flutter to the sidewalks in almost every city. Almost everyone has seen acorns lying about under oak trees and these, of course, are the tree's

seeds. Many have seen the catkins of the willows, the berries of the mountain ash, the horse chestnuts that are the seeds of these trees.

To get some kinds of seeds takes no more effort than to pick them up.

Such seeds can be planted in a flower pot or box. Not all will grow but many will. Their culture is simple—snugly packed in sandy soil, regularly watered, and many will sprout in a few days or weeks. After that their care is not widely different from the care of any plant.

This, of course, is the most rudimentary of tree cultural practices. Yet trees may be grown even in large numbers, and by only slightly more complicated processes, on any little plot of ground in city or country. Such a plot can be well spaded; sand can be added if its soil seems too stiff or clayey; leaf mold can be worked into it; then seeds, or small nursery trees, can be planted.

Such trees are for sale by many nurserymen and by numbers of forestry associations. They also are offered by several states—by their conservation commissions or forestry departments—at cost. That usually means at from two to four dollars for a thousand trees.

A thousand trees is a goodly number—enough for a large single bed or enough to be shared with others of a group of tree planters. These trees, once transplanted into the bed, become a miniature forest. As an adjunct to the school yard nothing could offer better instruction or arouse more interest. As such nursery trees grow they become crowded and must be transplanted. That is a job for a group of students; a job that should inspire their keen interest in trees.

In time these seedling trees will have grown sufficiently to be set out separately, in groups, hedge rows or as indi-

vidual specimens. They will offer a continuing and expanding program of cultural activity.

It has been customary, in many schools, to plant a single specimen tree on Arbor day. The practice is good but might be much improved upon; in addition to this single tree, a school forest might be started, using the method just described. With the aid of the county agent, the state or city forester, the experts from the public museum, all necessary cultural directions can be secured and such special aid as may be needed, acquired.

With bird feeding and tree planting goes that other form of bird protection given by providing nesting boxes or bird houses.

These, too, can be made successful in almost any location, recognizing that sparrows and nothing else will use

An owl house. A screech owl promptly took possession and raised an interesting family in this bird box.

them in congested districts in cities; that other birds will appear only as environment suits them.

But wrens can be attracted to the right kind of bird house in almost any city and no bird gives a more delightful return—in endless song and persistent work in the garden—than does the wren.

Robins will use small, open shelves, attached under the eaves. Bluebirds will use boxes in suburban and country places. Woodpeckers can be induced to use some kinds of houses and the little screech owl—perhaps as interesting and valuable a bird as any—promptly will take possession of a sufficiently large house under proper circumstances.

One trouble with many of the bird boxes that have been made—in schools and elsewhere—is that their entrance holes or doorways have been too large or too small; their dimension unsuitable; their construction bad.

It is regrettable that many thousands of American boys should have been induced to make bird houses, in the schools and elsewhere, without proper instructions. As a result many of these houses failed to attract anything, and the boys lost interest. To make a wren house with an entrance hole two or three inches across; a "house" of any kind for robins; a woodpecker box only six or eight inches deep, is to waste time.

The proper dimensions cannot be listed here but can readily be found in any good book on birds. There are many such books in every library.

As birds are attracted, another form of practical conservation is likely to develop. Birds like hedges, groves, sheltered places to fly to. They also like certain berries and other wild fruits. Where there is room—on a city lot or on the farm—these can be planted. That, again, is conservation since it means adding to the natural growths upon the land.

However, it is not the purpose here to go into the details; the purpose rather is to suggest that conservation is not a dark and gloomy science to be made use of only by studious men of scientific minds. It is not a field only for experts but for everyone. The plants and the smaller wilderness creatures, like the birds, offer endless opportunities for all to cultivate them, then almost unconsciously learn much about them, then do many things in their behalf and for their benefit. In return they give such pleasures, such satisfactions, as are not offered by more material things.

To make two blades of grass grow where one grew before is real conservation; and to make a tree grow, or to attract, feed and protect birds, are equally fine endeavors that bring their own compensations.

Even the wary Canada goose has been attracted to the homes of men by careful protection and feeding.

THE DECLINING FORESTS

In the north was Lost Forest. Railroads had passed it by. Highways had not pierced it. Men had overlooked it.

So its pines raised their crowns magnificently, to nod among the clouds. Its hemlocks hung their lacery of green across the glens. Its yellow birches furled their ragged bark and its maples spread their shadows in the sun.

Moss clung to its tree boles; ferns clustered in its hollows; and the trailing arbutus laid pink flowers on its mold.

In May life pulsed in the leaf-strewn earth. Then the ferns uncurled their fronds and the trilliums bloomed. Then the sap stirred, and buds unsheathed on the branches. Then Lost Forest stretched, like a man awaking, its every twig-end toward the dawning spring.

In August it drowsed under cloudless skies, the shadows cooling its fens. Then summer brooded among the trees and only the blue jay broke the silences.

But in October the maples flamed; an endless flurry of leaves, in red and gold, drifted from the hardwoods. Then the doe sped, on rustling trails, and the buck raced through the cedars.

Lost Forest sent a message over the woodlands. A woodpecker heard and came to the afflicted trees—where small, boring insects were working under the bark and deep into the heart-wood. The woodpecker, and many others of his kind, cut and tapped until the forest rang as with hammer blows. The birds opened the infected places, captured the grubs, and chipped away the diseased and rotting wood. Here is a tree, thus "treated" by woodpeckers. They are the "tree surgeons" of the forests. While this tree may have been too badly infected to be saved by the birds, their work upon it has saved neighboring trees from the grubs that else would have swarmed over the woodland.

By and by clouds piled in the sky. Frost rode the winds. And soon the hardwoods, all gray and black like a penciled sketch, were bare against the cold horizons.

Then snow came drifting to the tree tops, filtering past the maples, singing in the spruces. Then the ferns retreated deep into their leaf-beds; and trilliums and arbutus slept beneath the snows.

At last the blizzard roared. It moaned in the pine crowns and hissed in the balsams. It tossed the birches and elms and blotted out the world. And when the sun shone again it sparkled on a crystal forest—all wrapped and muffled for the winter, each little growing thing deep-covered in the silent places.

Soon a porcupine shuffled through the snows. Heavily he climbed into a hemlock. Clumsily he clambered to its uppermost branches. There he gnawed at the bark and fed contentedly. But as he did he cut the tender branch-ends with his teeth. One after another, they fell to the drifts below. And the deer, sniffing this fresh, green fodder, came to the hemlock tree and feasted.

Thus Lost Forest used Old Porky to feed its deer. While he munched contentedly, high in the tree tops, he cut the branch ends; and always they dropped, and the deer had food.

But the winter hardened. More blizzards roared and more snow hissed in the balsams. The deer began to cluster in the cedar swamp. There they pawed away the snow and found much good, cured marsh grass. So they gathered together, and made their beds under sheltering cedar boughs, and stayed.

More and more came. A buck from the far-off hills fought his way to the swamp. A doe floundered in and joined the herd. Another came and another. The swamp grew crowded.

Then the wisest of the does became uneasy. She felt cramped and hemmed in. She saw the pawed, soiled ground and instinct told her to beware disease. She went to the swamp-edge and looked out; but, seeing the drifts, she turned back again.

After all, it was comfortable in the swamp —soiled and trampled and crowded, but comfortable.

So she remained, though instinct bade her move and memory reminded her of the hemlock boughs, where the porcupines fed. Others of the older ones became uneasy, too. Yet all stayed because all were too satisfied to leave this haven for the hardships of the outer forest.

Then one night a fawn died and lay, next day, by a cedar tree. Yet the herd milled about. A few days later an old buck was dead, by a

great down-log. Yet the herd stayed on, and crowded close, and new members came to join it.

Then Lost Forest took a hand. While the moon was high and the world was cracking cold; while all was hushed in the frozen expanses, it bade Gray Wolf send his voice into the night.

Far away it sounded, from a hilltop. It rolled to the maples, echoed under the hemlocks, and struck deep into the cedar swamp—fierce and ominous and menacing.

Instantly the wise old doe was on her feet. Instantly the other wise ones sprang from their beds. They sniffed the winds as they stood rigid, like statues, facing the west.

Again the voice of Gray Wolf came faintly out of the hills.

The wise old doe hesitated no longer. She leaped through the herd, swept wide across the marsh, and plunged into the drifts. Others joined her, rearing, leaping, fighting through the great, unbroken snowfields.

But a few remained behind. For the voice of Gray Wolf was stilled now. The ominous howl no longer sounded in the cedars—and they were so comforting; so nearly clear of snow. There was marsh grass, so good, to feed upon. So a few stayed.

The spring passed, and the summer, but when the blizzard again had wrapped the world in its winter blanket, men came to Lost Forest. Then its pine crowns crashed; its hemlocks fell and its maples tottered under the blows of axes. Then Lost Forest was lost no longer; men had found it. And with the next spring there was nothing left except a few, poor scattered trees. But the forest immediately tried to re-establish itself. It started life stirring in a million seeds; it urged every fern and shrub to new growth, to cover the land and heal the wounds. And it would have succeeded, as other forests would succeed, except that the slash, here buried under the snow, inevitably is a source of fire. Fire starts as this slash becomes tinder-dry; and soon the new forest is flaming. Its new and young growth is destroyed.

It was these that Gray Wolf found, later on, when he and his pack came swinging around the swamp-edge. It was two of these the wolves pulled down, and feasted upon.

The wise old doe and the herd were far away.

Thus Lost Forest used Gray Wolf to drive the deer from their dangerous comfort. Thus the forest saved the herd; for else disease surely would have come to kill them, one by one, as they crowded close and soiled the swamp and layed together under the cedar boughs.

Gray Wolf and his pack hunted them many times after that and kept them moving. On every fourth or fifth day the wolves pulled one of them down, floundering in the drifts. But the best of them—the sturdy ones, the wise old doe and the strongest bucks—escaped the tearing fangs.

It was these that were left, to rear the fawns and lead the bands, when the spring came. And that was best, as Lost Forest knew.

Meanwhile the snowshoe rabbit played on the drifts, skimming over them on his broad pads. He feasted in the thickets and swamp-lands, finding there thousands of little trees, crowded close together. These he girdled as he nibbled their bark, and thereby he killed them. But Lost Forest watched, to see that only

enough of the trees were killed so the others better might grow; to see that the plantations were thinned, for the welfare of the forests, yet were not wiped out.

For, of course, the snowshoe rabbit cared nothing about the trees; he knew them only as something to feed on. He fed voraciously and began to do damage. So, one night, Lost Forest whispered another message to the distant hills. A great horned owl, in a far away spruce grove, heard it. The great bird sailed, on silent wings, across the glades. Like a shadow she sped to an ancient hemlock, overhanging the plantations of the little trees. There she waited.

The snowshoe rabbit and a host of his brothers came again to girdle the trees. Then the great horned owl struck—swooped down, arrow-like and silent, seizing the snowshoe, carrying him aloft into the dark forest, there to make a meal of him.

Then more owls gathered and, as the rabbits fed on the trees, the owls, in turn, fed on the rabbits, until the balance was restored and only enough trees were girdled to make room for those that remained.

Meanwhile some of the great trees, too, suffered. Small boring creatures tunneled under their bark and ate deeply into their heart-wood. Again Lost Forest whispered a message through the glens. In the bright, crisp morning a

woodpecker flew to a suffering elm. He, and others of his kind, began to chip and tap at the tree boles until the frosty forest rang as with many hammer blows. Soon the trees were opened and the grubs eaten—every diseased and infected place was chipped clear of its rotting wood and rid of its insect enemies.

Meanwhile brown creepers ran up and down the trunks, picking insect-egg clusters from their lodgments, in the rough bark. And chickadees, wafting across the open places like blown leaves, hunted all through the winter for bugs that hid in tangled, forest places.

So the forest used its creatures, one against another, yet each to help all, so all might endure. And thus Lost Forest stood when spring came, and the sap stirred, and the world was joyous and green again.

But then men came to the forest—men who carried strange, circular boxes with magnetic needles that pointed always to the north. And these men paced about under the trees, calling, "Tally one! Tally two! Tally three!"

They cruised for days, looking always upward at the great trees; making notes in little books—1,000 feet, 5,000 feet, 10,000 feet.

Lost Forest stirred uneasily then.

Yet the spring passed, and the summer, and the fall came, and all was well. But when the

blizzard once more had wrapped the world in its winter blanket, not only men but horses, tractors and sleighs moved into the forest. Then axes bit into the hemlocks and they fell, until a camp was made—its buildings shaped, a clearing cut, a tote road finished, and many logging roads and skidways begun.

After that Lost Forest was lost no longer. Men had found it. Its pine crowns crashed to the ground. Its spruces followed and its hardwoods fell as axes sang and cold saws whined on the winter air.

And when at last the men moved away, there was nothing left but a few, poor scattered

A pine stump. This tree was mature and ready for the harvest. But the slash left about it is a fire hazard and should be removed.

trees; and many miles of pine crowns, hemlock tops, lopped branches and stripped bark.

This slash lay under the sun and dried, as the spring advanced. The hurt forest tried hard to restore itself. It sent life surging through a million seedlings; it spurred the little saplings to growth; it pushed every fern and flower, to cover the land and heal the wounds and begin, all over, to make a forest.

But one day a hunter came, on the tote road, left winding through the slashings. Lightly he tossed away a cigarette, as he whistled a care-free tune.

The cigarette glowed red. A dry leaf, tumbled by a breeze, just touched the glowing ember. The leaf smoldered, went out, was fanned by the breeze again. It burst into flame.

The little flame licked at a cluster of pine needles. They sputtered, then flashed into small, hot flames. These reached into a spruce top and licked it tentatively. Suddenly they burst, with a spiteful hiss. They raged upward and found the shaggy bark of a birch tree. Then they roared into a flaming torch and showered sparks upon the tinder-dry slash. And soon a wall of fire was raging through the forest, destroying as it came.

The deer fled from the thickets. The does urged on their fawns but the little creatures stumbled and fell in the tangled brush. One plunged into a pile of slash and was caught there. In an instant the fire wall was upon it.

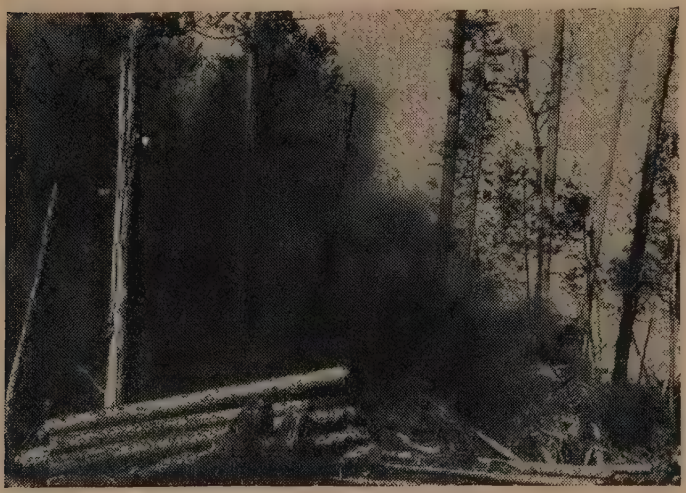
The fawn died as the doe fled madly across the brush heaps.

Another plunged down the side of a ravine. The fire wall dipped close behind it and buried it, under burning embers.

The rabbits scattered right and left but, dazed by glare and smoke, ran blindly back into the flame-sheet.

A grouse nested in a shrubby copse. Her clutch of eggs had hatched but an hour ago. The last of her chicks was breaking the shell.

She heard the roar and a hot wind fanned her, but she crouched lower over her nest. A



The result of leaving slash—almost inevitably—is a fire that sweeps the forest and destroys its new growth.

crackling came from the forest; a wisp of smoke; more heat to ruffle her feathers. Yet she spread

her wings protectingly over the new life, clustering under her.

Then an ember fell; a shrub burst into flame; a nearby mound of slash took fire. The fire wall itself bore down upon her and she rose, on swift wings.

But the whole upper air strata was searing as an oven, as it moved before the fire. The grouse whirled once, in a half circle, and fell back into the fire wall. The fluffy life in the nest was snuffed out by a single, leaping flame-tongue.

Thus fire desolated Lost Forest and thus it has desolated millions of acres of other forests in the United States. The story of Lost Forest is the story of most of the forests of America. They have declined because men cut them for timber; then because fire followed the lumbermen, destroying what was left.

Remnant forests usually were left that might have restored the old woodlands; but repeated fires destroyed these remnants.

Many water sources, including pools and springs, usually were left; but repeated fires helped to dry them up.

Wilderness creatures were left; but the fires destroyed many of them, too.

A few of these fires are started naturally—by lightning. An overwhelming lot of them are started by men.

Settlers in forest regions carelessly burn stumps or trash on their newly cleared fields. Sparks are blown into the forests and set them aflame. Or lumbering crews are careless in the woods, with matches or cigarettes. Or locomotives, sending sparks through their stacks, set brush aflame. Or hunters, campers or tourists carelessly leave camp fires. Or mere strollers in the woodlands toss aside their burning cigars, or empty their pipes upon the dry leaves.

Most forest fires could be prevented by care among men.

Modern equipment, especially pumps and hose lines, are needed to combat fires. Water is the best weapon against forest blazes.

Conservation has written laws upon the statute books of many states, making carelessness

with fire in the forests a punishable offense. But it is hard to enforce such laws—hard to find the culprit after a forest has been burned.

So more effort is made to stop the fires, after they have been started. Forest rangers watch the woodlands from towers. They note smoke as soon as it rises. They telephone to nearby headquarters, to neighboring villages, to resorts or other places, and call for men. They gather these men—trained forest rangers and untrained citizens alike—into groups and attack the fires. Often that means long tramps into the woods before the fire can be reached. Then, all too often, it means fighting the flames with inadequate tools.

Thus most fires still are fought with no more than shovels, axes, saws and grub hoes. Trees in their path are cut down. Ditches are dug. Sand is scattered, or thrown upon the flames. Rarely can these efforts stop a forest fire. More often it burns itself out. It reaches a river at last, or a lake shore, and there is stopped—or stops by itself.

Sometimes backfires are made. Backfires are nothing more than new fires, started ahead of the original blaze, then checked. Thus an area is burned and when the big fire reaches it, its fuel already is consumed. So it may die out.

But a backfire may, and often does, become as damaging as the main fire. It may get out of control in a dry forest and then is no less dangerous than the main body of the fire itself.

More effective than any other medium against fire is water. Water can be thrown onto forest fires by small but very powerful pumps. These are light enough to carry into the forests, set down by the sides of lakes, rivers or brooks, and from such sources, throw great streams against the flames.

But in most states not enough pumps are in use, not enough men regularly are employed to man hose lines, not enough water is made available for pumpage.

Pumps so small they can be carried by one man and set up beside almost any stream or pool, yet are able to throw a heavy stream.

So, until state legislatures and the United States congress make large appropriations—

many times larger than any that had been made up to 1930—forest fires will remain largely uncontrolled. Not until forest officers are permitted to organize forest fire departments that are as effective and as generously equipped as are city departments, will fire control be accomplished.

Conservation is urging such appropriations. It argues that the forest districts should be laid out as is a city—with water sources located; trails cut so fire fighters can get into the forest depths; artificial reservoirs formed by damming, deep in the woodlands; artificial pools created, to catch and hold rain water; with every step taken in advance, over large areas.

Such measures can be employed in the forests of the east, the lake states, and of some of the southern states. They cannot be used in all places in the west—in the great, rugged forests of the Rocky mountains, where men cannot penetrate and streams of water cannot be made effective, or where water cannot be found.

But where it can be found conservation wants it to be used, with the help of the most modern pumps or other equipment that is available or can be developed.

Other means of fire fighting are being, or perhaps might be, devised. Airplanes now are used for observation but airplanes might be used also to carry pumps and men. They are so used

in Canada and, occasionally, by the federal forest rangers.

Airplanes might be used to dust forests with proper chemical extinguishers, or with some forms of gases, though such materials were not available, in practical quantities, up to 1930. However, with enough money appropriated by congress, the federal forest service might develop new methods of fire fighting, including chemical methods. This conservation urges.

The federal foresters operate only in the federal forests. So conservation wants the forest states to create fire fighting units of their own; to protect not only public forests but also private forests.

Many states are doing this, through their conservation departments. Better protection, and better fire equipment, gradually are being acquired. But fires again burned everywhere in 1930—every forest state experienced them, during the hot, dry periods of the summer. And, if this destruction continues for many more years, say conservationists, there will be nothing left to protect.

Statistics again might be quoted almost endlessly. To say that 50,000 forest fires burn every year in the United States is to tell part of the story. To say that more wood growth is destroyed every year by fire than is used by men

for lumber should describe the tremendous loss by this destruction.

So conservation points to this greatest of all forest menaces—fire—as the chief cause for present forest decline. To compensate, forests must be restored by cities, villages, towns, counties, the states and the federal government, and then must be shielded against fires, or the nation will suffer. It inevitably must go into a decline, along with its forests, if it becomes a bare land, its water sources dwindling, its agriculture suffering.

The classic "horrible example" is China. That country, too, once was green and prosperous. It, too, had endless forests that covered its hills and valleys. Yet, like the United States, it recklessly cut, then burned, its forests. The result is known the world over. Each year the Yellow river—"China's Sorrow"—floods its lowlands. Each year China suffers alternate floods and droughts. Each year other nations are called upon to provide for China's famishing thousands.

That is largely because China has stripped herself of forests. In parts of the country not a stick of wood can be obtained and no railroad can be built because no ties can be found within hundreds of miles. In many parts of the land wood is a luxury. A bundle of small twigs is a rare gift, for fuel or any other purpose. And of shade, windbreaks, water source protection and

consequent good soil moisture and thriving crops, many areas know nothing.

A land thus denuded is a stricken land. It cannot be prosperous nor are China's millions prosperous.

In contrast, France and Germany have preserved forests. Though old countries, heavily populated, they continue to thrive. And the Scandinavian countries—Norway, Sweden and Finland—are heavily wooded. They, too, care for their forests. They harvest them but also restore them. Their forests are perpetual. They do not decline. Each year they yield timber but each year more grows to replace what is used. Forest fires practically are unknown because slash is disposed of, the forest floor is kept clean, and men are careful—very careful, for, to set fire to a forest in these countries, by carelessness or wanton intent, is an offense indeed.

Some villages in these countries have no taxes. They own town or village forests. They realize all the money they need for schools and all other governmental purposes from the forest products, annually sold from these forests.

So conservation urges forest restoration and especially fire protection. It contends that if the United States would hold its present preeminent position as among the most prosperous of all the nations, it must preserve and restore the conditions that fostered this prosperity.

QUESTIONS

1. What is meant by "practical conservation?"
2. Is it necessary to be an expert to help conserve birds, trees and some other natural resources? If not, explain why not.
3. Can a tree be planted in a flower pot? Explain what you know about this.
4. Why is fire a menacing forest enemy?
5. How do many forest fires get started? Name several ways.
6. How are fires discovered by forest rangers? What do they do, upon discovering a forest fire?
7. What is the most effective medium against fire? How is it applied in forest areas?
8. Are forest fires common in the United States? Do they destroy less, as much as, or more wood growth than is used by men for lumber?
9. What country is used as the "classic example" of woeful forest destruction? What conditions prevail in that country?
10. What European countries give especial care to their forests? In what way have some villages in those countries profited by forests?

Themes for Compositions or Recitations

Write a composition (or recite) on one of the following topics.

TOPIC No. 1

Re-read the story of Lost Forest, from page 13 to page 25 of chapter 6.

1. Describe, in your own words, how winter settled upon Lost Forest.

2. Explain in what way the porcupine, feeding on the hemlock trees, aided his forest brethern. Also, how did the woodpecker help Lost Forest?

3. Describe how the deer gathered in the cedar swamp, why they gathered there, and what they browsed on.

4. When Gray Wolf drove the deer out of the swamp, killing some of them, did he injure or benefit the herd? In what way? How are wilderness creatures like deer kept alert, keen, physically strong, and eternally active?

5. Describe, in your own words, the condition of Lost Forest after men had found it—what they did, how the forest looked, and how it struggled to restore itself. Finally, describe the fire that at last destroyed Lost Forest.

TOPIC No. 2

Re-read pages 26 to 31 of chapter 6. Then write from 500 to 750 words, describing forest fires and how they can be prevented or put out.

1. First explain how fires usually are started, listing several common causes for them. What is best—to prevent fires or to fight them after they are burning? What preventative measures can you think of?

2. Explain how fires still are fought by old-time methods and what these methods are, including "back fires."

3. Now explain more modern methods and especially how forest districts should be laid out for fire fighting. Is the modern plan of fire fighting in the forests comparable to city fire fighting? Be sure you understand the difference as well as the similarity.

The science of conserving—here, by scientific treatment of the forest area, this grove of Norway pines has been grown by natural reproduction. By keeping fire from the area, by providing good, natural conditions, the young trees have thrived and now are ready for thinning. This will be done by foresters. In time a stand of fine timber will be secured here. The casual student need not know how, scientifically, to grow trees. That is work for trained foresters. But he should understand the general aims and purposes underlying these scientific efforts—and be sufficiently informed so he can become a forceful part of public sentiment, or public opinion, which has made all scientific conservation work possible.

CHAPTER 7

A. Scientific Conservation

(7) The Science of Conserving

SCIENTIFIC CONSERVATION

Scientific conservation is conservation as practiced by scientists or experts. It is professional conservation. It is the kind of conservation engaged in by trained foresters, fish culturists, biologists, landscape architects and planning engineers.

It is conservation based on known facts, or on cautious deductions made after much investigation. It is a conservation that not only says: "We must preserve forests," but also knows why and where and how to preserve them.

To practice scientific conservation requires training. It means study, as close as is required in the other professions—engineering, medicine, law or chemistry. Nor have the institutions of higher learning been slow to provide the proper courses. Complete training in forestry and many of its allied branches now is offered by universities in:—

California, Colorado, Georgia, Idaho, Iowa, Louisiana, Maine, Michigan, Minnesota, Montana, New Hampshire, New York, (at both Cornell and Syracuse) Oregon, Pennsylvania, Utah, and Washington; and the universities of Yale, Harvard and Purdue each offer degrees in forestry and even in some of its special branches.

Furthermore, entry into the field of scientific conservation now is provided by most of the states and by the federal government, through their conservation departments. Thus, by joining the warden or ranger forces, young men may progress to advanced places in the administration of forests, wilderness creatures or lakes, streams and marshes.

Opportunities in these fields are increasing. The practice of conservation, under governmental bodies, is expand-

ing. Thus the federal forest service now has a chief forester, assistant forester and branches of forest management, lands, research, experiment stations, engineering, and public relations. It has many district foresters, directors of experiment stations and of range stations, and a large force of rangers.

The federal government also employs foresters in the Indian service, entomologists in the bureau of entomology, pathologists in the bureau of plant industry, biologists in the biological survey, fish culturists in the bureau of fisheries.

Nor are the states far behind. In 1930, 42 out of the 48 states had conservation departments, employing a few or many men.

So the student, interested in conservation as a possible profession, has a choice of openings; they might be classified somewhat as follows:

Under forestry—

1. Private technical forester.
2. Federal or state forester.
3. City forester.
4. Forest nurseryman.
5. Silviculturist (or "tree surgeon.")
6. Forest seedsman.
7. Forest Research Specialist.
8. Forest Economist.
9. Forest Hydraulic Engineer.
10. Forest Ranger.
11. Fire warden.

Under scenery conservation—

1. Planning engineer.
2. Landscape architect.
3. Park engineer.
4. Recreational engineer.

Under creature conservation—

1. Game specialist.
2. Fish culturist
3. Fur producer.
4. Game producer.

Other fields or places may occur to him. The older professions—the highly specialized field of the biologist or botanist; the specialized branches of zoology, ichthyology, ornithology, etc.; are, of course, not only open to him but have a wider scope today because of conservation. The state, city or individual that acquires forests or parks, and

that thereby must give attention to their plants or animals, of course needs the advice of such specialists beyond any demands of the past.

Perhaps the foregoing list deserves more detailed discussion.

As a private technical forester the student would establish an office and engage in timber estimating, mapping and surveying for lumbermen; in planting or caring for trees for developers of forest estates; in solving silvicultural problems for owners of forested areas used for recreational purposes, summer homes or otherwise; in finding markets for producers of new forest products; in selective logging, or sustained yield work, for lumbermen or others; in laying out plantations for pulp or paper mills. In fact, as a private or technical forester he would sell his services in a wide field that is enlarging as industries or individuals more urgently need, or desire, to cultivate trees.

As a federal or state forester he would go into the employ of one of the many governmental departments, his aim being to win a place as administrator of one or more large, governmental forests.

As a city forester he would go into the employ of one of the several hundred larger cities that now employ foresters to care for their park and street trees.

As forest nurseryman he would specialize in tree growing, perhaps giving special attention to producing large quantities of trees from seeds for the enlarging market, as states, cities, towns, schools and individuals demand seedling trees in quantities, for forest plantations. He might, too, grow small trees in pots—"living trees"—now demanded for ornamental purposes or for planting. And he might develop a market for nursery-grown Christmas trees. The supply of small spruces or balsams is dwindling, everywhere in the country. A shortage may occur, though not immedi-

ately evident. Furthermore, a strong public sentiment against the ruthless cutting of trees for Christmas use has developed in the country and the time for nursery-grown, and "certified" trees probably is near at hand.

As silviculturist or "tree surgeon," he would engage in caring for the trees on private estates, in cities that do not employ foresters, for small home owners, and on farms.

As forest research specialist he would investigate unusual forest problems—perhaps how to hasten the growth of some kinds of trees; how much water to keep on a forest swamp, how much to drain off, to improve tree conditions; how to fertilize a forest plantation or how to stop damage by unknown enemies, whose nature must be determined by research.

As forest economist he would understand how best to use forest products and apply this knowledge to help forest owners wisely select certain trees or find markets for products of the forest that may be new or untried. There should be much opportunity in this endeavor. Many forest products—cord wood, scattered slash that might be good firewood, small saplings, even branches and bark—should be usable. The problem has been to find markets for them.

As forest hydraulic engineer he would use his knowledge of the waters in conjunction with forests to aid certain industries. This is a new field, yet seems to offer an opening to properly prepared students. For instance, the New Haven Water company has a 20,000 acre forest around its sources of supply. Obviously other water companies, paper mills, cities and general water users will need to give similar attention to their supplies. They will need engineers of different mind than usually are found in the profession—engineers that recognize the vital importance of forests

rather than of mere reservoirs, dams or other engineering works, if water is to be conserved.

As a forest ranger he, of course, would go into the service of government, engaging in all those interesting outdoor activities that are the life of any ranger.

As a fire warden he would aim to become chief warden, or fire superintendent, in one of the states or in federal service. There is much opportunity here since forest fire fighting is in its infancy. It yet is operating by crude methods and with crude tools. In time forest fire organizations probably will become as specialized, and as scientifically founded, as any city fire department. The chief fire warden then will be in relatively the place of the fire chief of a large city.

As planning engineer—in this sphere of conservation—the student would enter a broad field that has only begun to open. He would aid the states in laying out highways, from a scenic viewpoint; in planning parks or parkways; in zoning certain areas for or against billboards and some other structures; in restoring desolated or cut-over lands; in selecting campsites for tourists, picnic grounds for the people or water-front facilities for public use. He would operate as a private practitioner, in a consulting capacity, or he might be employed by a state, county or city.

As a landscape architect, of course, he would lay out and plant estates, public parks, gardens and other similar developments.

As a recreational engineer he again would enter a comparatively new field. It, too, is a promising one. As industrial changes provide more leisure for more people, recreation becomes an important subsidiary to their other activities. Skilled men, who understand recreational facilities, are needed in many places. Wisely to plan playgrounds, bathing

beaches, golf courses, large summer resorts; or to lay out the grounds of a hunting or fishing club, or even to arrange public shooting grounds, requires good basic knowledge and specialized training.

As a game specialist he would enter the employ of a state or individuals who have large estates—especially of sportsmen who desire hunting for themselves or their friends, or who have an interest in raising game birds or other creatures. This field, too, is expanding as the nation's natural hunting grounds decline and as a slow but sure trend toward European conditions—hunting preserves in private hands—develops.

As a fish culturist he might find a place in the federal bureau of fisheries or in any one of 42 state conservation departments that have, or probably will establish, fish divisions. Then, too, an increasing number of individuals, clubs or groups are making rearing ponds, and even private hatcheries, and need experts to handle them.

As a game producer he enters a highly specialized field. Successfully to produce furs for market, by breeding, caring for, and ultimately pelting, semi-domesticated creatures like the beaver, the fox, the raccoon, the muskrat or the otter, decidedly requires an expert. There are few such. The probabilities are that any young man able to demonstrate his ability along these lines will have little difficulty in finding employment and, ultimately, a responsible position. A single fur farm in Wisconsin has been selling more than $1,000,000 worth of pelts yearly for a number of years. The business is a big one, but full of pitfalls. It needs specialists.

Finally, as a game producer the student would engage in the breeding and raising of game birds or animals for the market. The market is two-fold: Individuals, counties and states desire such creatures to restock their wilderness areas;

a considerable demand for game as food is found in the larger cities.

These then are among the opportunities that stand before the student who may consider conservation as a profession. Such a student must decide for himself how profitable these fields are likely to be and what obstacles are likely to lie between him and success. Obviously, most of the conservation activities demand professional careers. Returns, in the professions, depend largely on personal work. Unlike some of the industries, they do not yield "profits." Unlike some businesses, they cannot be started, than largely left to themselves or to others, yet produce good returns. To choose a professional career, in conservation or other fields, therefore may not be the shortest way to riches. Perhaps, however, it has compensations in personal satisfaction that some other endeavors do not give in equal measure.

The student should consider this. Among the professions, skilled or scientific conservation now seems to offer equal opportunities with the others. And, incidentally, many of its branches are as open to women as to men.

Headquarters for the trained foresters of Wisconsin, in the forests on Trout lake, in that state. Public interest is needed to secure such forest stations as these.

THE SCIENCE OF CONSERVING

The "science of conserving," in America, had quaint beginnings.

It was King George of England who first vaguely sensed that the great forests of his American colonies might be worth some attention. So, in 1696 he sent a "royal surveyor of the woods."

The business of this official presumably was to prevent heedless forest destruction. However, hardly had he become familiar with the new land than he agreed with its colonists—forests were in the way; they were obstructions to progress; they were inexhaustible in any event. No amount of cutting or burning could unduly reduce them.

So he engaged in defining boundaries for owners, or in settling disputes about grants or rights, rather than in checking deforestation.

At about the same time William Penn began to wonder about his own Pennsylvania—which means "Penn's woodland"—over which he was governor. So he ordered that one acre of forest be left in every five acres of land. The order might as well have been given to the winds. Pennsylvania's settlers failed to see why anybody should preserve forests. They disregarded their governor's mandate.

Then Connecticut adopted an ordinance against timber removal from any of its townships. The idea was that timber should be cut only for home use. Thus Connecticut hoped to preserve a supply for its people. But again the efforts failed because early Americans considered any timber conservation unnecessary.

In 1799 congress appears to have become troubled by the thought that perhaps the forests were not endless. Wars, at the time, largely were fought on the seas and the navies were made up of wooden ships. It occured to congress that it might be a good precaution to preserve some building material for the navy. So it appropriated $200,000 to buy a forest reserve containing ship timbers.

In 1827 it directed officials to grow live oaks for the same purpose. Again some forest tracts were purchased and some efforts made to insure a supply of live oaks.

By 1873 there were enough denuded acres in the east so congress thought that something ought to be done about the forests. It passed the so-called "timber culture act." This act granted a patent to 160 acres of public land to any settler who would plant and care for 40 acres of forest in the treeless sections—on the Great Plains and other parts of the west.

In 1876 a special agent was appointed by the department of agriculture to study forest con-

ditions in the United States. He made reports that disclosed wide deforestation. Ten years later the division of forestry was created in the department of agriculture. In 1901 it became the bureau of forestry and, in 1905, the forest service.

This federal forest service, under the department of agriculture, today is the greatest single agency for conservation in the country.

It administers, conserves and *puts into use* about 160,000,000 acres of national forests. There were 163 national forests in 1930. Not all of these forest *areas* are "forests." Some are bare of trees over large parts of their acreages. Others are in cut-over districts—are, therefore, covered only by brush, saplings, small growths of one kind and another, and not different to the eye than millions of acres of denuded land. But they are areas that can and will be made to grow trees. They are areas that the federal forest service hopes to restore to timber.

Such national forest areas as have much good timber *are being cut.* That is, mature, ripe or surplus trees are being harvested. Crops of timber are being taken from the national forests. They are *in use.* They are timber plantations. They are producing something.

That is one of the first principles of scientific conservation: Conserve for use! Conserve

The work of trained fish culturists. This is an artificially-made trout stream at a north state fish hatchery. Trees have been planted, nearby forests are preserved, and thousands of trout and other fish are grown in these and nearby waters. This, too, is the science of conserving. Its details need not concern the non-professional conservationist. He is interested rather in the broad proposition that fish ought to be produced in needful numbers. How to produce them he well may leave to the skilled expert. But such experts are developed and find opportunity for their work only as there is informed public interest in conservation as a whole.

for a good purpose! Conserve to perpetuate not only the resources themselves but their useful functions.

President Roosevelt once said: "Wise forest protection does not mean the withdrawal of forest resources, whether wood, water or grass, from contributing their full share to the welfare of the people; on the contrary, they give assurance of large and more certain supplies. The fundamental idea of forestry is the perpetuation of the forests by use. Forest protection is not an end of itself; it is a means to increase and sustain the resources of our country and the industries which depend upon them."

So the national forests are in use. They are producing timber. Their grazing lands are being pastured. Their facilities are serving such purposes as are in the public interest.

This is the chief distinction between national forests and national parks. The parks are not in use in the same way. They are areas of great beauty and are preserved for their scenic values. Their trees are not cut. Their aspects are not changed. They are used, but only for recreational purposes. Hundreds of thousands of people visit them, to *look* at them. That also is use—the proper use of fine scenery. But national forests are not chosen for their scenery but for their present or potential timber. They are forest plantations, to be harvested when the

crop is ready; to be selectively cut, then replanted; to be administered so they will be permanent, but not so they will be taken out of use.

This distinction is important. Every student should understand it. There are national forests and national parks. They are not the same. The forests are timber plantations, the parks are scenic areas. The parks yield recreation and incidental enjoyments; the forests also yield these—they, too, usually are open to campers, tourists, hikers, hunters and fishermen—but in addition they yield timber, pasturage, and such other surplus products as they have.

Returning to the federal forest service: It is divided into branches. Its administrative branch is headed by an official called "the forester." He is the chief executive, the foremost conservation official in the United States. The other branches are: Operation, forest management, range management, lands, research, engineering, and public relations.

The work of the forest service is confined to the national forests and such other incidental federal lands as may be assigned to its care.

In the national forests the service first of all tries to grow trees. It cares for trees already growing, giving special attention to fire protection. It grows seedling trees in forest nurseries, then transplants them to the forest areas.

It tries gradually to spread or increase the forests by these transplantations and by natural reproduction—that is, by creating conditions so that, as trees naturally cast their seeds about, these will sprout and grow.

Where it has heavy stands of timber it logs them, or sells the logging privilege to lumbermen. This logging is selective—that is, only selected trees are cut. Scientific logging operations are demanded. These usually include slash disposal, careful felling of the mature trees so the least damage will be done to younger trees, and other precautions.

The forest service also administers the ranges in the national forests, there being many thousands of acres. These ranges are grass lands, sometimes entirely bare of trees. However, ultimately trees will be planted upon them or the natural forest will be encouraged to expand over them. Meanwhile they offer good pasturage, so the forest service leases them to cattle or sheep men for grazing purposes. Careful regulations are made to govern such grazing.

The service also protects wild life in the national areas by making game preserves in some of them. On the other hand, it permits hunting where game seems plentiful.

In addition it co-operates with the states. Under the provisions of various laws it contri-

butes money for state forestry activities like fire control and tree planting.

Finally, it maintains research and experiment stations to study intricate forest problems. It also has a forest products laboratory at Madison, Wis., devoted to the study of wood, its composition, and possible new uses for it.

This branch of the federal government, then, is the nation's greatest scientific conservation agency. Here the science of conserving is practiced by skilled men, backed by annual appropriations of approximately $9,000,000. The work is extended over most parts of the country, since national forests now have been established in the east, south, and middle west, as well as in the far west.

Other Scientific Services

The greatest single agency for scenery conservation is the national park service, a bureau in the department of the interior. This administers the great national parks like Yellowstone and Glacier. It not only preserves their scenery but arranges for the care of the thousands of visitors who come to them every year.

The federal agency for creature conservation is the bureau of biological survey, also under the department of agriculture. Its function is to study the needs of wilderness creatures, protect them, or destroy such of them as are

harmful to crops or domestic animals. While this service has aided in the preservation of some creatures, especially migratory birds, it frequently is criticized by conservationists because of its extensive killing operations—its thousands of poison baits and other devices to destroy predatory and some other animals and birds.

The United States bureau of fisheries, in the department of commerce, is the greatest single agency engaged in scientific fish conservation. It has jurisdiction over the fisheries of the federal waters—the sea coasts, navigable streams and such lakes as are controlled by the federal government. Here it studies fish conditions, operates hatcheries, plants millions of fish, and rescues others from land-locked pools, left by retreating rivers. The bureau also regulates seal hunting in Alaska, watches over salmon fishing, inspects canneries, and aids in devising methods to improve fishing conditons. In 1929 this bureau distributed 2,861,236,000 fish eggs, 4,063,948,000 fry, and 136,185,500 fingerlings.

There is no federal agency whose business is to conserve water. Various departments make water surveys, chart the coasts, and guard against disaster or loss of life on the seas or the Great Lakes; but none specifically is charged with preventing water waste or protecting water sources. The army engineers have charge of navigation and its problems, but they make no

attempt to provide water, or halt its loss, except by engineering works. They build harbors, dredge channels, erect levees, wing dams and other structures, but attempt no conservation in the real sense of the word.

These and a few other bureaus are the federal agencies for scientific conservation. They employ trained men and their work is skilled and scientific.

Work of the States

At least 42 states now have set up similar conservation bodies. It would be fruitless to describe each of these 42 organizations. The best of them begin with a conservation commission. It usually is appointed by the governor and includes five or more men. These are selected from among citizens interested in conservation. Usually they are not scientific conservationists —that is, they are not trained foresters, fish culturists, planning engineers or game experts. Rather they know, in a general way, about the conservation needs of their states.

However, they employ trained men for their conservation departments. Such departments usually have a chief administrative officer who may be a forester. He, in turn, employs additional foresters, game experts, fish culturists, perhaps a park superintendent and numbers of conservation wardens, forest rangers and fire wardens.

These men constitute the trained, or scientific staff. They are the actual office and field workers. The commissioners formulate policies and have general supervision over this staff; the staff then carries out the policies.

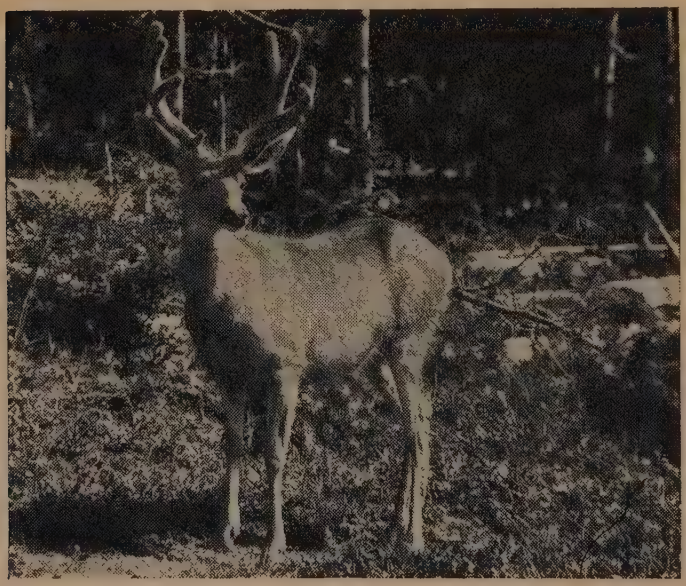
The organizations in the various states differ—some have a commission, some do not. A few have very small conservation departments—merely a single forester and an assistant or two; others have large and well-manned divisions. Some appropriate only a few thousand dollars for conservation work, others many hundred thousand dollars. Thus New York and Pennsylvania have funds in excess of a million dollars annually; Wisconsin nearly three-quarters of a million; Michigan, Minnesota, Alabama, California, Connecticut, Maine, Massachusetts, New Jersey and Ohio, generous sums; other states appropriate various amounts.

Like the federal bureaus, these state organizations practice the science of conserving. Trained men study their problems and attempt to solve them. These scientific studies have revealed certain intricate problems like forest taxation and land utilization.

Land that has standing timber—large, mature trees—upon it may pay comparatively high taxes. A piece of forested land may be worth $100,000 and must pay taxes on this assessment; yet the same land, stripped of its trees, would be

worth only a few thousand dollars and would pay taxes on this comparatively small sum.

So lumbermen hasten to cut the trees. They say that, in some places, they would like to preserve them for many years; however, they cannot afford to do it if the states keep on taxing the forest, perhaps increasing taxes every year as timber becomes more valuable. So they cut the trees even though there may be no great demand for the timber. Thus taxation causes deforestation.



This Virginia deer is another example of the science of conserving. Trained creature conservationists watch over the herds of Jasper national park in Canada, the home of this specimen.

A number of states have enacted special forest taxation laws that exempt the forest itself

from all except "yield taxes." These are paid only when the forest is cut and then are based on the yield, or timber actually produced. By this plan no undue tax burden is imposed upon lumbermen who keep their trees. Only a small annual tax is collected on the land itself, assessed as though it were bare of timber.

While this tax problem need not be closely studied by the casual student, it is an important matter under the science of conserving.

The second problem—land utilization—has to do with the wise use of land. Not all land should be cleared and made into farms; neither should some lands be put into forests. Perhaps settlers should not be permitted to locate wherever they please—far from villages; deep in forest areas; remote from schools and other public services. When they do they cost the public much money. Their children are entitled to schooling so a school must be built, for a few children from one or two families; or the children must be transported by bus or otherwise, to a distant school. Roads must be maintained and other public services provided beyond any tax returns that can be collected from such settlers. So a few states are considering a land utilization policy under which settlement, and other development, would be regulated.

Another problem develops as lumbering proceeds and leaves many thousand acres of cut-over lands unused. What is to be done with them? Shall they be made into pasture lands, replanted to forests, converted into farms, or used for recreation?

Courtesy Canadian National Railroads.
Again, a forest pool where beavers are at work, preserved by scientific conservation in the Canadian wilderness.

Again, these are not matters that the casual conservation student need go deeply into. He should know that they exist, as problems. As for the more obvious efforts of the state departments—

The more completely organized of them have divisions of forestry, parks, game, fire protection, and fisheries. These give attention to forest conservation, creature conservation and scenery conservation.

A few states also have planning divisions, or engineers, to aid highway departments lay out roads for beauty as well as for traffic utility. Also, a few now are attempting to set up divisions for zoning—to regulate the placement of billboards and other structures, establish "scenic districts" or "reserves," and otherwise preserve the natural lovliness of the country.

Finally, most state conservation departments have a division of publicity or education, whose purpose is to keep the people informed, and supplied with educational material.

The state forest rangers, wardens and fire rangers plant trees, thin out stands of brush, build trails or fire lines, watch from observation towers for signs of smoke, and combat fires. They enforce game laws; see that protected animals and birds are not molested; watch the haunts of beavers and other fur bearers to prevent prohibited trapping; feed game birds like grouse or quail during cold winters and heavy snows; perhaps operate game farms and raise pheasants or other creatures for release in wilderness areas; and operate fish hatcheries,

planting young fish in lakes and streams or rescuing fish that have become landlocked.

Gradually the states are enlarging and consolidating their conservation activities under strong departments and trained men. One branch of conservation alone—and perhaps the most vital of them all—gets little attention in most states, except incidentally. It is water conservation. Usually conservation departments have no water conservation divisions; no engineers whose primary business is to see that the state's water sources are protected, its lakes and streams kept clean and full.

There are federal reclamation projects in the west but their purpose is to get water onto dry areas, thereby irrigating the land, not to conserve water in the broader sense. A few states, with semi-arid districts, control water sources and regulate water use; but even these do little to create conditions that will bring more water, or effectively will conserve all the water there is. Certainly, some foresters locate state forests with a view to protecting water sources; some plant trees around the headwaters of streams; and some states have engineers who build canals, levees or dykes to protect land. But bureaus whose sole or primary business is to conserve the waters are not included in the conservation departments of most states.

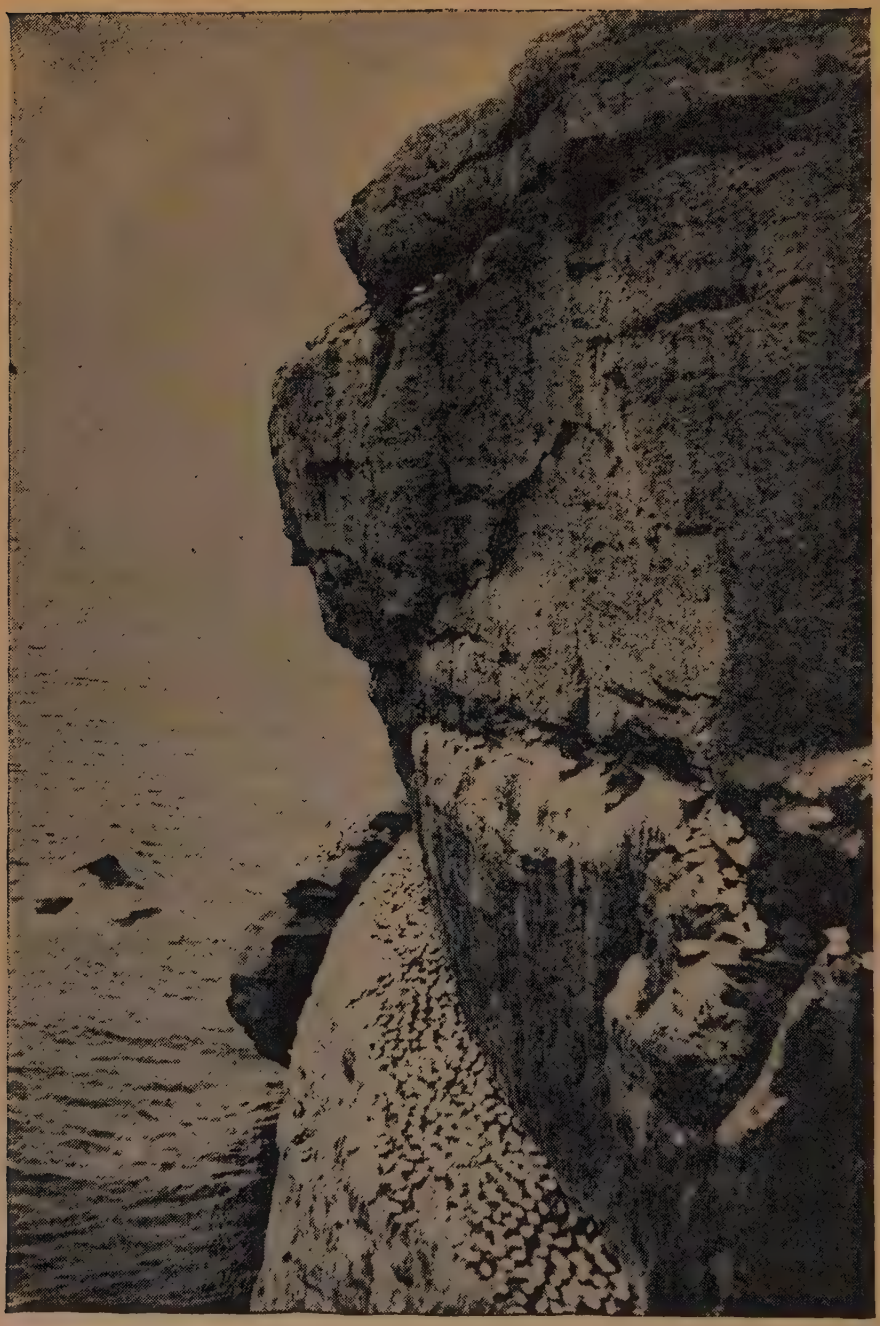
The federal departments and the state conservation commissions, then, are the primary centers of scientific conservation. Many state universities and state agricultural and other departments also are active in this field. Counties and cities practice the science on the most modern highways, streets and parks. Towns and school districts practice it when laying out town or school forests. Some mills and lumber companies practice it, with the aid of trained men, when they plant forests or pulp wood plantations for future use. Some farmers practice it to perpetuate their woodlots. Every application of sound knowledge, to problems of conservation, is "the science of conserving."

Public Sentiment

Scientific conservation was made possible by public sentiment.

Public sentiment is an inexpert, but usually sound, public impulse or instinct. It "feels" rather than reasons. Yet without it not a single one of the federal bureaus or state conservation commissions would exist. It is because the people demanded conservation that these scientific bodies were organized.

The people saw forests fall. They knew little about the exact effects of this deforestation but had "a feeling" that something should be done about it.



A great sea bird sanctuary on Bonadventure island, off the Gaspe coast of Quebec. All the white specks that so completely dot the cliffs, are nesting gulls and ganets. The preservation of bird life is one of the important functions of "creature conservation" since, without birds, agriculture probably would be impossible. All growing things, including the forests, probably would succumb

The people saw wilderness creatures destroyed—slaughtered recklessly, in immense numbers, and gradually disappear. Again they sensed that this was not good. They did not closely analyze why; did not ask exactly what each animal or bird contributed to human welfare. But many protested and demanded that government—their state legislators or federal congressmen or senators—do something about it.

Gradually these public demands bore fruit. The senators or state legislators enacted laws to prohibit this or that, to do thus or so. These first laws were not always adequate so people got together, to study conditions and develop more influence, for better laws. They formed such organizations as the American Tree association, the American Game Protective association, the Izaak Walton league, the Audubon societies, the General Federation of Women's clubs, the American Nature association, forcefully to express public demands. They thereby got the many conservation departments that today are functioning.

"The people" do not know much about the science of growing trees, protecting animals or preserving scenery—nor need they. Trained men—scientific conservationists—can be found to do the actual work. But upon the people—the whole people of the United States—depends the future of the natural resources, especially

forests, wilderness creatures, lakes, streams, marshes, and scenery. Only as each American learns enough about the subject to have a general understanding will public demands for sound conservation be rightly directed.

Conservation can preserve the nation's natural riches and thereby the prosperity of the people; it can keep the country beautiful and good to live in. Neglected, there will be gradual despoilation and an impoverished national life. Thinking Americans should not permit such a decline.

America was a beautiful land. It was laden with riches to serve men's needs. They gave material prosperity and influenced character. They wove a wholesome strain into American life—a strain combined of courage, cheer and fortitude; a strain that is sturdy and true; a strain born of sunshine in the skies, trees waving green, fair waters, and a living, natural background. That strain will prevail against the influences of evil, if Americans will let it live. It lives by its natural background—on its foundation in the unspoiled fields and forests.

America has taken much from that foundation. It is time, now, to pause, and to restore.

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